3.0 AFFECTED ENVIRONMENT

3.1 PHYSIOGRAPHY, GEOLOGY, AIR QUALITY

As shown on Figure 3-1, the southern two-thirds of Hidalgo County (which includes the study area) is located along the U.S.-Mexico border within the Interior Coastal Plains Physiographic Province (Bureau of Economic Geology (BEG), 1996). The plain was formed during the Cenozoic Era as rivers deposited large volumes of sediment into the deltas of the Gulf of Mexico (Swanson, 1995). The topography is very flat, with elevations ranging between 30.5 m and 33.5 m (100 and 110 ft) above mean sea level (MSL) over most of the study area. A small hill (La Lomita) located along FM 494 rises to approximately 41.1 m (135 ft) MSL.

Study area bedrock geology consists of Quaternary-aged Alluvium and the Tertiary-aged Goliad Formation. Recent alluvial deposits underlie the majority of the study area. These alluvial materials consist of floodplain deposits associated with the Rio Grande and include mud, silts, and sands (BEG, 1976). The Goliad Formation consists of clay, sand, sandstone, marl, caliche, limestone, and conglomerate and reaches a thickness of up to 182.8 m (600 ft) (BEG, 1976).

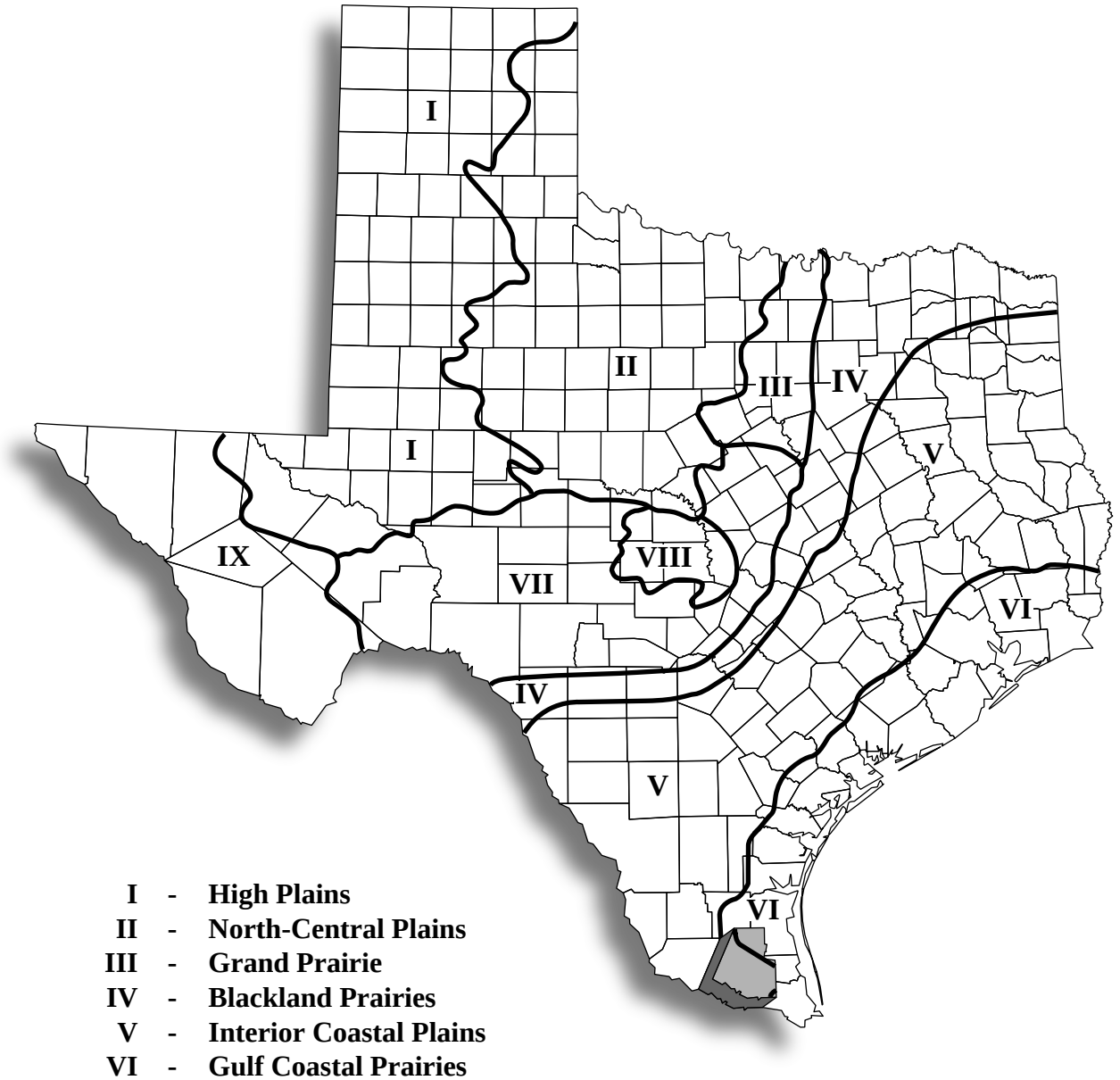
The Clean Air Act, which was last amended in 1990, requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The Clean Art Act established two types of national air quality standards:

- Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly.
- Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA Office of Air Quality Planning and Standards has set NAAQS for six principal pollutants that are called "criteria" pollutants. They are carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), particulate matter (PM), and sulfur dioxide (SO_2). Particulate matter has been further divided into particulate matter with particle diameters of 10 micrometers or less (PM_{10}) and particulate matter with particle diameters of 2.5 micrometers or less ($PM_{2.5}$). Air quality is generally considered acceptable if pollutant levels are less than or equal to these established standards on a continuous basis.

The Clean Air Act also requires EPA to assign a designation to each area of the U.S. regarding compliance with the NAAQS. EPA categorizes the level of compliance or noncompliance as follows:

1. Attainment - area currently meets the NAAQS
2. Maintenance - area currently meets the NAAQS, but has previously been out of compliance
3. Nonattainment - area currently does not meet the NAAQS



I - High Plains
II - North-Central Plains
III - Grand Prairie
IV - Blackland Prairies
V - Interior Coastal Plains
VI - Gulf Coastal Prairies
VII - Edwards Plateau
VIII - Central Texas Uplift
IX - Trans-Pecos Basin & Range

north

100 0 100

scale in miles

Source: BEG, 1996

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Figure 3-1

LOCATION OF HIDALGO COUNTY
IN RELATION TO THE
PHYSIOGRAPHIC PROVINCES OF TEXAS

SHARYLAND - DC MEXICO TIE PROJECT

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Hidalgo County is in a region of South Texas known as the Brownsville-Laredo Intrastate Air Quality Control Region. This region includes Cameron, Hidalgo, Jim Hogg, Starr, Webb, Willacy, and Zapata counties. The air quality emissions from Hidalgo County include those from non-road mobile air emission sources associated with agriculture and construction, oil and gas production, cotton seed mills, surface coating operations, and other light industry; Hidalgo County is considered to be in an EPA designated attainment area.

The Texas Commission on Environmental Quality (TCEQ) is responsible for monitoring air quality within the state and for reporting that information to the EPA and the public. The staff examines and interprets the causes, nature, and behavior of air pollution in Texas. The TCEQ operates two air quality monitors within Hidalgo County and one in Cameron County. The air contaminants being monitored include CO, O3, PM10, and PM2.5 in the ambient air along with parameters such as air, temperature, wind velocity, and other meteorological data. The results of these monitoring data show the region currently meets the NAAQS for all criteria pollutants.

3.2 WATER RESOURCES

3.2.1 Surface Water

The study area is located within the Rio Grande and Nueces-Rio Grande Coastal drainage basins (Texas Water Development Board (TWDB), 1997). The portion of the study area between the main levee and the river itself is the only part that actually drains to the Rio Grande. The remainder of the study area is in the Nueces-Rio Grande basin, and drains east via a network of man-made drainage ditches, floodways, and the Arroyo Colorado, all the way to the Laguna Madre estuary on the gulf coast (TWDB, 1997). Although approximately 315.4 km (196 miles) of the Rio Grande is designated as a Wild and Scenic River, that segment is several hundred kilometers upstream of the study area, in far west Texas.

Historically, the Rio Grande and its tributaries have experienced severe flooding problems associated with heavy rains, inadequate drainage, and hurricanes. The completion of Amistad and Falcon reservoirs on the river upstream of the study area, and construction of floodway diversion channels, have lessened the effect of floodwater and created a more uniform flow through the Lower Rio Grande Valley. Anzalduas Dam is operated by the IBWC and is used to divert floodwaters from the Rio Grande into the Hackney Lake Inlet (or Banker Floodway), divert irrigation water into a canal on the Mexican side of the river, and to regulate water flows for downstream users on both sides of the border. Other than the Rio Grande, there are virtually no natural drainage features in the study area, and most surface water occurs in the numerous drainage/irrigation ditches.

A detailed floodplain analysis was conducted for Hidalgo County by the Federal Emergency Management Agency (FEMA) in 1982(a); for the City of Mission in 1991; and for the City of McAllen in 1982(b). The resulting Flood Insurance Rate Maps were used to review the limits of the 100-year floodplain within the study area. Based on the FEMA studies, the portion of the study area located between the north levee and

the Rio Grande is within the 100-year floodplain associated with the Rio Grande. There are also depressional land features scattered throughout the study area which fall within the 100-year floodplain.

EO 11988 (Floodplain Management) generally discourages federal construction activities in floodplains. Agencies are required to evaluate the potential effects of any actions it may take in a floodplain. This process ensures that planning programs and budget requests reflect considerations of flood hazards and floodplain management and prescribes procedures to implement the policies and requirements of this order.

3.2.2 Wetlands/Jurisdictional Waters of the U.S.

Waters of the U.S., which are regulated by the USACE under Section 404 of the Clean Water Act include, but are not limited to, territorial seas, lakes, rivers, streams, oceans, bays, ponds, and other special aquatic features including wetlands. The USACE uses the regulatory term "ordinary high water mark" in describing the jurisdictional portion of a stream. This term refers to the established line on the bank or shore indicated by the fluctuation of water (an average width is determined). Wetlands have been defined in a broad sense as transitional areas (ecotones) between terrestrial and aquatic systems where the water table is usually at or near the ground surface, or the land is covered by shallow water (Cowardin et al., 1979). Under normal circumstances, wetlands are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation that is typically adapted to living in saturated soil conditions. Wetlands contain a predominance of hydrophytic vegetation, have hydric soils or hydric soil indicators, and show evidence of wetland hydrology. Wetlands generally include bogs, seeps, marshes, swamps, forested bottomland wetlands, and other similar areas (USACE, 1987).

EO 11990 (Protection of Wetlands) requires that government agencies avoid construction in wetlands unless there are no practical alternatives and unless all practicable measures to minimize harm to wetlands are included in the program.

Wetlands in the study area and vicinity have been mapped by the FWS in their National Wetlands Inventory (NWI) program. Several palustrine features, the majority of which are excavated semipermanently flooded water bodies, are located between the Rio Grande and the north levee, in the southwestern portion of the study area. A relatively large surface water feature is located on the southeast side of the community of Madero, in the southwestern corner of the study area. The approximately 7-ha (17.2-ac) feature is roughly 167.6 m (550 ft) north of the applicant's preferred route. The Rio Grande is identified as a riverine feature. These wetlands are located on Figure 2-3 (map pocket).

3.2.3 Groundwater

Groundwater provides only limited amounts of water to the supplies of the Lower Rio Grande Valley. Over 97 percent (%) of water needs are supplied by surface water, groundwater being utilized primarily when surface water is in short supply during drought periods (TWDB, 1990).

The Gulf Coast Aquifer underlies nearly the entire Nueces-Rio Grande Coastal Basin. In the eastern part of the basin, saline water overlies fresh water supplies (TWDB, 1997). Two subsurface aquifers provide most of the groundwater resources within Hidalgo County. These are the Evangeline and Chicot aquifers. The approximate depth to groundwater in the study area is 3.1–4.6 m (10–15 ft) below ground surface (TWDB, 1990).

3.3 SOILS

3.3.1 Soil Associations

Two general soil associations occupy the study area, containing more than 15 separate soil types described by the Soil Conservation Service (SCS [now the Natural Resources Conservation Service (NRCS)], 1981). These soil associations are the Harlingen-Runn-Reynosa and the Rio Grande-Matamoros.

The Harlingen-Runn-Reynosa Association is nearly level and typically found on terraces. Harlingen soils make up approximately 55% of the unit and Runn and Reynosa soils make up 27% and 10% of the unit, respectively. Benito, Cameron, Laredo, and Olmito soils make up the remaining 8% of this unit. This soil association is described as having deep, very slowly to slowly and moderately permeable soils that are moderately well drained. They typically have grayish brown clays, silty clays, and silty clay loams in the surface layer.

The Rio Grande-Matamoros Association, located in the southern portion of the study area, consists of nearly level soils on bottomlands. Rio Grande soils make up about 42% of the unit, Matamoros soils make up about 24% of the unit, and Camargo, Grulla, and Zalla soils make up the remaining 34%. This soil association is described as containing deep, moderately to slowly permeable soils that typically have a light brownish or grayish-brown silt loam or silty clay surface layer. These soils are used mostly as irrigated cropland.

3.3.2 Prime Farmland

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, or oilseed (7 U.S.C. 4201(c)(1)(A)). Approximately 59% of Hidalgo County soils are considered prime farmland in their native state, while an additional 11–20% of the county's soils are considered potential prime farmland, if irrigated (SCS, 1979).

Within the study area, approximately 85% of the land may be considered prime farmland either in its native state or if irrigated. The majority of soils that are not considered prime farmlands are so classified because of salinity problems or development.

Harlingen-Runn-Reynosa soils have a medium potential for croplands on non-irrigated soils and a high potential on irrigated soils. These soils have a low potential for citrus, medium potential for vegetables, and a high potential for rangeland. Rio Grande-Matamoros soils have a medium potential for non-irrigated crops, and high potential for irrigated crops.

3.4 VEGETATION

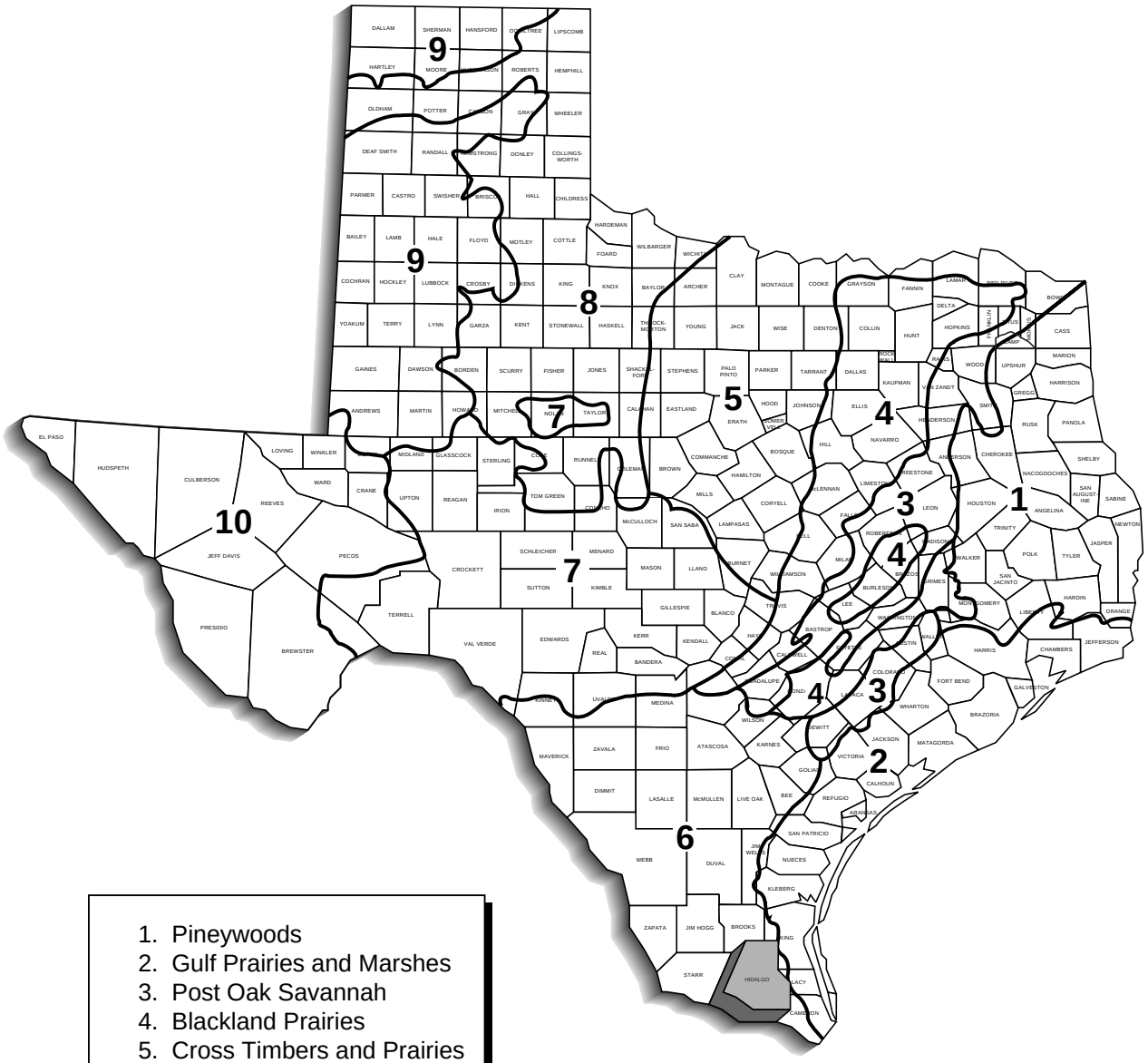
3.4.1 Regional Vegetation

As shown on Figure 3-2, Hidalgo County lies within the South Texas Plains vegetational area as delineated by Hatch et al. (1990). The South Texas Plains includes approximately 8,093,725 ha (20,000,000 ac) of level to rolling land dissected by streams flowing to the Gulf of Mexico. Elevations range from sea level to approximately 304.8 m (1,000 ft) above MSL. Average annual precipitation ranges from 40.6 to 88.9 cm (16 to 35 inches), occurring mostly in the spring and fall. Summers are often characterized by drought conditions that are frequently of sufficient duration to depress crop growth.

The South Texas Plains vegetation area approximates the Tamaulipan Biotic Province of Texas (Blair, 1950). Blair further describes the Lower Rio Grande Valley (Starr, Hidalgo, Cameron, and Willacy counties) as a distinct biotic district (the Matamoran) within the Tamaulipan Biotic Province (Blair, 1952). Thorny brush is the dominant vegetation type in the Matamoran District. The Matamoran District has poorer drainage and more-luxuriant vegetation than northern portions of the Tamaulipan Biotic Province.

Climate, edaphic factors, and past human activity have influenced the vegetation of the Lower Rio Grande Valley, resulting in a shrubland climax of mixed-brush and acacia associations. The unique ecology of the Lower Rio Grande Valley is characterized by a combination of climate, vegetation, and wildlife associations unlike anywhere else in the U.S. (Jahrsdoerfer and Leslie, 1988). Plants with western desert, northern, coastal, and tropical affinities comprise the vegetation community of the region. Historically, the Tamaulipan brushland was characterized by two vegetation communities, mesquital and chaparral.

Two general types of brush habitat are currently predominant in the Lower Rio Grande Valley: riparian and scrub forests, and upland thornscrub and thorn woodlands (Jahrsdoerfer and Leslie, 1988). Riparian and scrub forests are associated with the Rio Grande and consist of several intergrading habitat types of taller stature than adjacent vegetation communities. These areas are particularly important to wildlife as they provide habitat corridors throughout the Lower Rio Grande Valley. Upland woodlands represent the most extensive brushland habitat remaining in the Lower Rio Grande Valley. Upland sites are intersected



Source: Hatch et al., 1990

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Figure 3-2

LOCATION OF HIDALGO COUNTY
IN RELATION TO THE
VEGETATIONAL AREAS OF TEXAS

SHARYLAND - DC MEXICO TIE PROJECT

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by dense riparian strips (ramaderos) that provide important nesting and foraging habitat for wildlife and access to habitat along the Rio Grande.

The FWS further delimits the vegetation of the region, identifying brush woodland community types. Hidalgo County north of the Rio Grande floodplain is described as the mid-Delta Thorn Forest Community (FWS, 1985). This community contains a mixture of honey mesquite (*Prosopsis glandulosa*) and granjeno (*Celtis pallida*) mixed with Texas ebony (*Pithecellobium flexicaule*), anacua (*Ehretia anacua*), and brasil (*Condalia hookeri*). Less than 5% of this once-extensive community remains, and remnant tracts are generally restricted to 40.5 ha (100 ac) or less and are scattered in distribution (Jahrsdoerfer and Leslie, 1988).

3.4.2 Vegetation Community Types in the Study Area

The vegetation in the study area consists of a mixture of agricultural crops and native brushlands, woodlands, and grasslands. Agricultural crops include food, forage, and fiber crops, with cotton, grain sorghum, sugar cane, and citrus being of primary importance. The portion of the study area north of the floodway levee consists primarily of agricultural crops, with some native plant communities present in scattered tracts, typically in federal preserves, along drainage ditches and canals, and along the perimeters of cultivated fields. Native plant communities within the study area include riparian and scrub forests, and upland thornscrub and thorn woodlands. Riparian and scrub forests are associated with the Rio Grande and consist of several intergrading habitat types of taller stature than adjacent vegetation communities. Upland thornscrub and thorn woodlands represent the most extensive brushland habitat remaining in the Lower Rio Grande Valley. These native communities typically consist of a mixture of trees and shrubs including, but not limited to, honey mesquite, granjeno, Texas ebony, anacua, and brasil. In the study area these communities are limited to several tracts of the LRGV NWR along the Rio Grande, the La Lomita National Register Historic District, and several smaller, undeveloped tracts amidst the agricultural areas.

3.4.3 Important Species

Important species are those that (a) are commercially or recreationally valuable; (b) are endangered or threatened; (c) affect the well-being of some important species within criterion (a) or criterion (b); or (d) are critical to the structure and function of the ecological system or are biological indicators.

The study area lies in the Lower Rio Grande Valley of Texas, one of the state's major crop-producing regions. Agriculture in Hidalgo County is of major importance with cotton, grain sorghum, corn, cool-season vegetables, and citrus being the most important crops (Texas Agricultural Statistics Service (TASS), 1997). Bell peppers, tomatoes, melons, and cucumbers are also produced. None of the soil map units in the study area is classified as a native range site, although most are potentially suitable for pastureland or hay crops. Varieties of bermudagrass and introduced bluestems are the usual forage crops on grazingland in Hidalgo County.

Several shrub and tree species provide browse and cover for wildlife and domestic livestock. Texas kidneywood (*Eysenhardtia texana*) and vine ephedra (*Ephedra antisyphilitica*), are among woody plants eaten by cattle and white-tailed deer (*Odocoileus virginianus*). Anacua, huisache (*Acacia smallii*), Texas ebony, brasil, and spiny hackberry provide nesting habitat for the white-winged dove (*Zenaida asiatica*).

Information was obtained from the Texas Biological and Conservation Data System (TXBCD) concerning the occurrence and location of state and federally listed plant species in the vicinity of the project. The official state list of endangered and threatened plant species promulgated by the TPWD includes the same species listed by the FWS as endangered or threatened. Currently, 30 plant species are listed by the FWS as endangered or threatened in Texas (FWS, 2002a). The FWS and the TPWD have identified three state and federally listed endangered plant species as potentially occurring in Hidalgo County (Table 3-1). These are the star cactus (*Astrophytum asterias*), Texas ayenia (*Ayenia limitaris*), and Walker's manioc (*Manihot walkerae*). Of these, only Walker's manioc has been recorded within the study area.

Star cactus grows on sparsely vegetated areas in gravelly, saline clays or loams at low elevations in the Rio Grande Plains. Historically, the star cactus occurred in Starr, Hidalgo, and Cameron counties; however, it is currently known in the U.S. from only one location in Starr County and is found in semi-arid grassland and open thornscrub (FWS, 1995; Janssen, 1998). Star cactus flowers from March through May.

Texas ayenia occurred historically in Hidalgo and Cameron counties. It is currently known in the U.S. from a single population in Hidalgo County (Janssen, 1998). This population is located approximately 35.9 km (22.3 miles) east of the study area near the City of Progresso. Previously found in openings in chaparral and edges of thickets, the known location is a Texas Ebony-Anacua plant community on well-drained but heavy soils on riparian terraces.

Walker's manioc, known historically from Starr and Hidalgo counties in the U.S., is near extinction. Until recently, only one natural population (consisting of one plant) was known to occur in the U.S., and that was in Hidalgo County (FWS, 1993). However, four other populations have since been discovered: three in Hidalgo County and one in Starr County (Janssen, 1995, 1998). Recorded habitat descriptions from collections of the species vary from brush to grasslands (within the protection of brush), and sandy loam soils overlying caliche (Poole and Riskind, 1987). One recently discovered population in Hidalgo County occurs in highway ROW just north of La Joya (Janssen, 1998). According to TXBCD (2003), a historic record of Walker's manioc may be located adjacent to Alternative B, between the Rio Grande and the north levee, but the accuracy of this location is questionable (i.e., may be within 2 km (1.2 miles) of mapped location).

Six plant species of potential occurrence in the study area are considered species of concern (SOC). These species are Texas windmillgrass (*Chloris texensis*), small papillosus (*Echinocereus papillosus* var.

TABLE 3-1

ENDANGERED, THREATENED, OR RARE PLANT SPECIES
OF POTENTIAL OCCURRENCE IN HIDALGO COUNTY

Scientific Name[1]	Common Name[2]	Status[3]		Habitat[4]	Counties of Known Distribution[4]
		FWS	TXBCD		
Astrophytum asterias	Star cactus	E	E	Grasslands and brushlands in partial shade in gravelly clays and loams	Cameron, Hidalgo (H), and Starr counties; Nuevo Leon and Tamaulipas, Mexico
Ayenia limitaris	Texas ayenia	E	E	Mixed evergreen/deciduous woodlands in alluvial deposits on floodplains and terraces along the Rio Grande; in sandy clay loam	Cameron and Hidalgo counties; Coahuila and Tamaulipas, Mexico
Chloris texensis	Texas windmill-grass	SOC	NL	Sandy to sandy loam soils in coastal prairies	Brazoria, Brazos (H), Chambers, Galveston, Harris, Hidalgo (?), Nueces and Refugio counties
Echinocereus papillosus var. angusticeps	Small papillosus	SOC	NL	Sandy to gravelly soils in grasslands or mesquite-acacia shrublands	Hidalgo (H), Jim Hogg (?) and Starr counties
Justicia runyonii	Runyon's water-willow	SOC	NL	In brush and subtropical woodland margins on floodplains in calcareous silt loam, silty clay and clay soils	Brazoria (?), Cameron, Goliad (?) and Hidalgo counties; Tamaulipas, Mexico
Manfreda longiflora	Runyon huaco	SOC	NL	Thornland on terraces, slopes, and hills in Rio Grande Valley	Cameron (H), Hidalgo and Starr counties; Tamaulipas, Mexico
Manihot walkerae	Walker's manioc	E	E	Thorny shrubland on sandy loam soils on ridges or grasslands	Hidalgo and Starr counties; Tamaulipas, Mexico
Matelea radiata	Falfurrias (milkvine) anglepod	SOC	NL	Clay soils and dry gravelly hills	Brooks (H) and Hidalgo (H) counties
Tillandsia baileyi	Bailey's ballmoss	SOC	NL	Epiphytic on trees and shrubs in brushlands and subtropical woodlands	Brooks (H), Cameron, Hidalgo, Jim Wells, Kenedy, and Willacy counties; Tamaulipas, Mexico

[1]According to Correll and Johnston (1979).

[2]According to FWS (2002a).

[3]Status according to FWS (2002a); (TXBCD, 2003).

[4]According to Poole and Carr (1997), and Correll and Johnston (1979).

FWS – U.S. Fish and Wildlife Service.

TPWD – Texas Parks and Wildlife Department.

TXBCD –Texas Biological and Conservation Data System.

TOES – Texas Organization for Endangered Species.

E – Listed as endangered (in danger of extinction).

SOC – Species of Concern. A species for which some evidence of vulnerability exists, but not enough to support listing at the present time.

NL –Not listed.

H – Historical in Texas, having not been verified in the past 50 years.

angusticeps), Runyon's water-willow (*Justicia runyonii*), Runyon huaco (*Manfreda longiflora*), Falfurrias anglepod (*Matelea radiata*), and Bailey's ballmoss (*Tillandsia baileyi*). SOC have no legal protection under the Endangered Species Act (ESA).

Texas windmill-grass is an endemic perennial grass that occurs on sandy to sandy loam soils in open to barren areas in prairies, grasslands, ditches, and roadsides from southeast Texas south to the Rio Grande (Correll and Johnston, 1979; TXBCD, 2002). Texas windmill-grass flowers from October through November.

The small papillosus is a columnar cactus that occurs in sandy to gravelly soils in grasslands and mesquite-acacia shrublands (Weniger, 1988, TXBCD, 2002). Small papillosus is an endemic species, occurring only in northern Hidalgo County.

Runyon's water-willow is a woody perennial that occurs in calcareous silt loam, silty clay, or clay soils in openings in subtropical woodlands located on active or historic floodplains (Correll and Johnston, 1979; TXBCD, 2002). The species has been recorded in Cameron and Hidalgo counties, with possible records from Brazoria and Goliad counties (TXBCD, n.d.). It is commonly associated with sedge species (*Cyperus* spp.) and flowers from September through November (TXBCD, 2002).

Runyon huaco, also known as St. Joseph's staff, is an endemic perennial aloe that inhabits openings in thorny shrublands on clay and loam soils with varying concentrations of salt, caliche, sand, and gravel (TXBCD, 2003). The species typically occurs on soils overlying the Catahoula and Frio formations, but may also occur on Rio Grande floodplain alluvial deposits. It has been recorded in Hidalgo and Starr counties, with unconfirmed reports from Jim Hogg and Cameron counties. There are only four known populations, consisting of approximately 60 plants, within 17.7 km (11 miles) of each other in the Los Olmos Creek drainage area in Starr County (Damude and Poole, 1990). Runyon huaco flowers in September (TXBCD, 2002).

Falfurrias anglepod, also known as Falfurrias milkvine, is an endemic vine that was previously known only from one collection from Falfurrias. A second record from Starr County was labeled erroneously, and is actually from Hidalgo County (TXBCD, n.d.). The species' known range includes Brooks and Hidalgo counties, and possibly Starr County (TXBCD, n.d.). Little is known about the species and its preferred habitat is unknown. Falfurrias anglepod is thought to flower from May through June (TXBCD, 2002).

Bailey's ballmoss is epiphytic on various trees and shrubs (honey mesquite, *Quercus* spp., and Texas ebony) in South Texas brushlands and in evergreen subtropical woodland in the Lower Rio Grande Valley (TXBCD, n.d.). Flowering occurs from February to May (TXBCD, 2002).

3.4.4 Ecologically Sensitive Areas

Approximately 95% of the original native brushland in the Lower Rio Grande Valley has been converted to agricultural or urban use since the 1920s and more than 90% of the riparian woodland on the U.S. side has been cleared (Jahrsdoerfer and Leslie, 1988). Remnant patches of native brushland and mid-valley riparian woodland are found within the study area, and should be considered sensitive because of their rarity, unique character (these communities are found nowhere else in the U.S.), and potential for providing habitat for some endangered, threatened, or rare plant and animal species.

Sensitive natural communities identified by the TXBCD (2003) as occurring within the study area include the Texas ebony-anacua series.

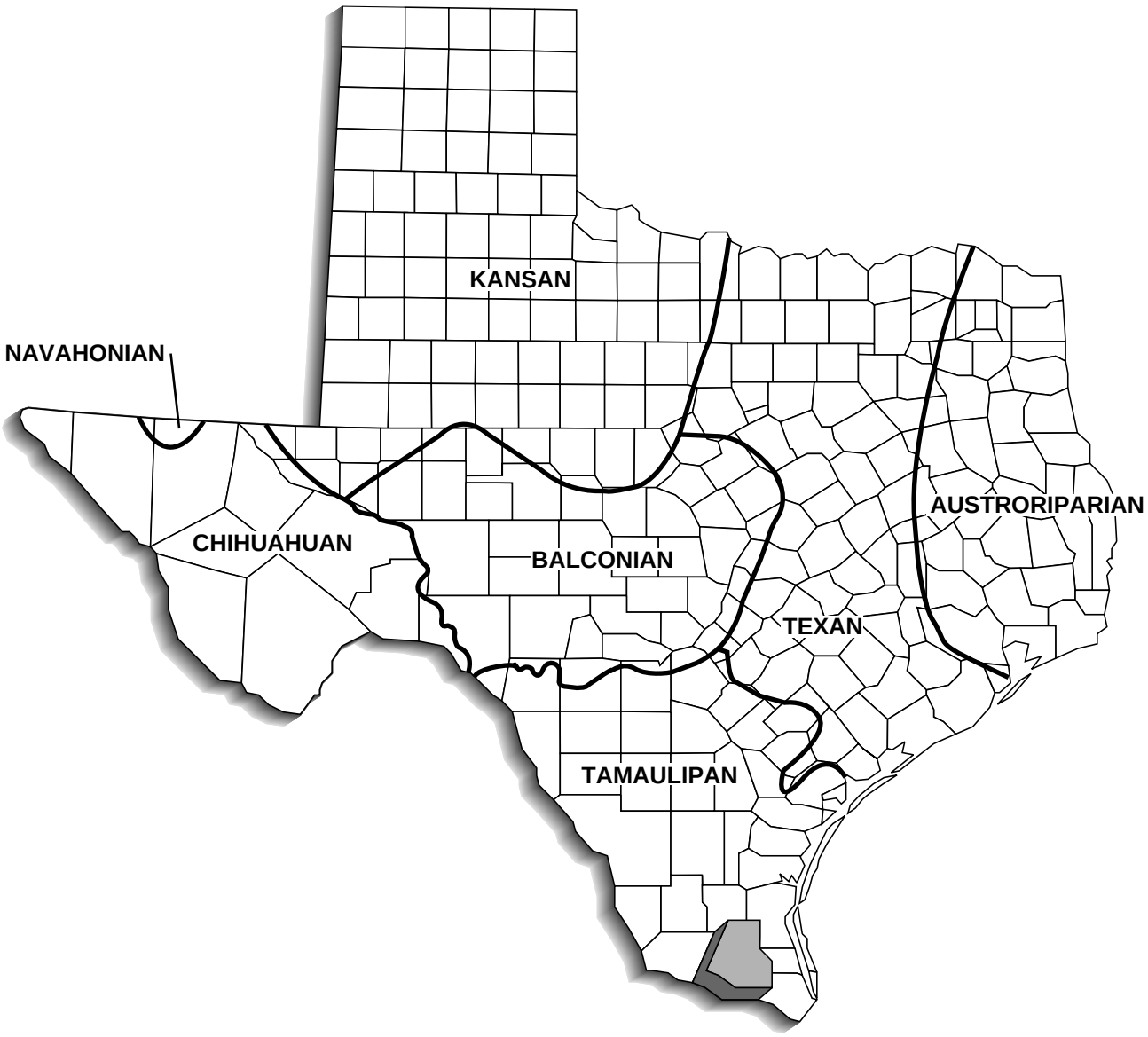
The Texas ebony-anacua series is an evergreen subtropical forest community that occurs mainly on well drained river or resaca terraces in the Lower Rio Grande Valley. Snake-eyes (*Phaulothamnus spinescens*), coma (*Bumelia celastrina*), colima (*Zanthoxylum fagara*), brasil, lotebush, and honey mesquite are typical plants of this vegetation series.

Although these communities are not normally considered rare, because of extensive past agricultural clearing activities in the Lower Rio Grande Valley, virtually any native woodland or brushland type merits consideration as a rare vegetation community.

3.5 WILDLIFE

Blair (1950) delineated seven biotic provinces in Texas. Hidalgo County falls within the subtropical, semi-arid Tamaulipan Biotic Province, as illustrated in Figure 3-3. Thornscrub woodland is the dominant natural plant community type within this province (Blair, 1950); however, less than 5% of the mid-delta thornscrub component of the Tamaulipan Biotic Province remains (Jahrsdoerfer and Leslie, 1988). Within this province, Blair designates the Lower Rio Grande Basin (Starr, Hidalgo, Cameron, and Willacy counties) as the Matamoran District in contrast to the Nuecian District to the north, based on drainage, floral and, to some extent, faunal differences (Blair, 1950, 1952). The eastern coastal areas of the Tamaulipan Biotic Province are within the Gulf Prairies and Marshes vegetational area. The regional fauna contains coastal as well as typical inland species.

The fauna of the Tamaulipan Biotic Province includes numerous neotropical species, numerous grassland species that also range north of the province, some Austroriparian species from the east, and a small number of Chihuahuan species from the west (Blair, 1950, 1952). Numerous neotropical invertebrates and vertebrates are limited in their U.S. distribution to the Tamaulipan Biotic Province, and many are found within the U.S. only in the Lower Rio Grande Valley.



north

100 0 100 200

scale in miles

Source: Blair, 1950

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Figure 3-3

LOCATION OF HIDALGO COUNTY
IN RELATION TO THE
BIOTIC PROVINCES OF TEXAS

SHARYLAND - DC MEXICO TIE PROJECT

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3.5.1 Wildlife Habitats and Species

The wildlife habitat types in the study area largely correspond to vegetation types described in Section 3.4. These habitat types include grassland (including pasture), brushland, riparian, hydric and aquatic areas, agricultural, and residential.

The study area is predominantly agricultural land, much of it intensively farmed, so wildlife inhabiting the study area generally consists of species adapted to fields, field margins and cropland/pastureland. In general, the wildlife expected to occur in the study area is typical for the general area. No species is considered endemic to the study area. Characteristic species of the area are discussed below. Relict wooded and brushland habitat is limited in extent and found along fencerows and irrigation ditches.

3.5.1.1 Amphibians

According to Blair (1950), the Tamaulipan Biotic Province supports three urodele (salamander) species, one of which, the black-spotted newt (*Notophthalmus meridionalis*) is endemic to the region. The other two species are the Rio Grande lesser siren (*Siren intermedia texana*) and the barred tiger salamander (*Ambystoma tigrinum mavortium*). Sixteen anuran species (frogs and toads) have been recorded from Hidalgo County (Dixon, 2000). Several genera are represented, including spadefoots (*Scaphiopus* spp.), chorus frogs (*Pseudacris* spp.), true toads (*Bufo* spp.), and true frogs (*Rana* spp.).

3.5.1.2 Reptiles

Six freshwater/terrestrial turtle species have been recorded in Hidalgo County. These are the yellow mud turtle (*Kinosternon flavescens*), Rio Grande river cooter (*Pseudemys gorzugi*), red-eared slider (*Trachemys scripta elegans*), Texas spiny softshell turtle (*Apalone spinifera emoryi*), ornate box turtle (*Terrapene ornata ornata*), and Texas tortoise (*Gopherus berlandieri*). Several of these species may occur in the study area. The American alligator (*Alligator mississippiensis*) has also been recorded from Hidalgo County.

At least 19 species of lizards and 36 species of snakes occur in the Tamaulipan Biotic Province (Blair, 1950) and 18 lizard and 28 snake species have been recorded from Hidalgo County. Common lizards include whiptails (*Cnemidophorus* spp.), skinks (*Eumeces* spp.), the green anole (*Anolis carolinensis*), and Mediterranean gecko (*Hemidactylus turcicus*). Snakes include rat snakes (*Elaphe* spp.), water snakes (*Nerodia* spp.), and venomous species such as the western diamondback rattlesnake (*Crotalus atrox*) and Texas coral snake (*Micrurus tener*).

3.5.1.3 Birds

The study area region supports an abundant and diverse avifauna. Species that are of potential occurrence in the study area include year-round residents such as the great blue heron (*Ardea herodias*), snowy egret

(*Egretta thula*), turkey vulture (*Carthartes aura*), white-tailed kite (*Elanus forficatus*), Harris's hawk (*Parabuteo unicinctus*), northern bobwhite (*Colinus virginianus*), American coot (*Fulica americana*), killdeer (*Charadrius vociferus*), laughing gull (*Larus atricilla*), rock dove (*Columba livia*), mourning dove (*Zenaida macroura*), inca dove (*Columbina inca*), common ground-dove (*Columbina passerina*), white-tipped dove (*Leptotila verrauxi*), greater roadrunner (*Geococcyx californianus*), groove-billed ani (*Crotophaga sulcirostris*), pauraque (*Nyctidromus albicollis*), ringed kingfisher (*Ceryle torquata*), golden-fronted woodpecker (*Melanerpes aurifrons*), great kiskadee (*Pitangus sulphuratus*), Couch's kingbird (*Tyrannus couchii*), green jay (*Cyanocorax yncas*), cactus wren (*Campylorhynchus brunneicapillus*), Carolina wren (*Thryothorus ludovicianus*), northern mockingbird (*Mimus polyglottos*), lark sparrow (*Chondestes grammacus*), northern cardinal (*Cardinalis cardinalis*), red-winged blackbird (*Agelaius phoeniceus*), eastern meadowlark (*Sturnella magna*), great-tailed grackle (*Quiscalus mexicanus*), brown-headed cowbird (*Molothrus ater*), Altamira oriole (*Icterus gularis*), and house sparrow (*Passer domesticus*) (McKinney, 2002).

Migrants/summer residents such as the green heron (*Butorides virescens*), white-winged dove (*Zenaida asiatica*), yellow-billed cuckoo (*Coccyzus americanus*), common nighthawk (*Chordeiles minor*), black-chinned hummingbird (*Archilochus alexandri*), brown-crested flycatcher (*Myiarchus tyrannulus*), eastern kingbird (*Tyrannus tyrannus*), scissor-tailed flycatcher (*Tyrannus forficatus*), cliff swallow (*Petrochelidon pyrrhonota*), barn swallow (*Hirundo rustica*), indigo bunting (*Passerina cyanea*), dickcissel (*Spiza americana*), and orchard oriole (*Icterus spurius*) are potential visitors and/or occupants of the study area (McKinney, 2002).

Migrants/winter residents that may potentially frequent the study area include the American white pelican (*Pelecanus erythrorhynchos*), mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), northern shoveler (*Anas clypeata*), osprey (*Pandion haliaetus*), sharp-shinned hawk (*Accipiter striatus*), American avocet (*Recurvirostra americana*), greater yellowlegs (*Tringa melanoleuca*), spotted sandpiper (*Actitis macularia*), sanderling (*Calidris alba*), Forster's tern (*Sterna forsteri*), eastern phoebe (*Sayornis phoebe*), orange-crowned warbler (*Vermivora celata*), savannah sparrow (*Passerculus sandwichensis*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*) (McKinney, 2002).

The Migratory Bird Treaty Act (MBTA) implements various bilateral treaties and conventions between the U.S., Canada, Mexico, Japan, and the former Soviet Union for the protection of migratory birds. The MBTA prohibits intentional and unintentional take of migratory birds, including their nests and eggs, except where permitted. According to the MBTA, ". . . it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received and migratory bird, part, nest, egg or product, manufactured or not." EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) directs federal agencies to "ensure that environmental analyses of federal actions required by NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern." In 2002, FWS issued the publication *Birds of Conservation*

Concern 2002 (FWS, 2002b), which lists bird species of conservation concern by geographic region (Bird Conservation Areas (BCAs)). FWS recommends that these lists be consulted in accordance with EO 13186. The study area is within BCA-36 (Tamaulipan Brushlands—U.S. portion only). Thirty-six birds of conservation concern are listed by FWS as occurring within BCA-36 (Table 3-2). It should be noted that inclusion on the list does not imply that a species is known to occur in the study area, but only acknowledges its presence in the BCA.

3.5.1.4 Mammals

At least 61 mammalian species occur or have occurred within recent times in the Tamaulipan Biotic Province (Blair, 1950). Those recorded in Hidalgo County include the coyote (*Canis latrans*), common raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), black-tailed jackrabbit (*Lepus californicus*), Mexican ground squirrel (*Spermophilus mexicanus*), and bobcat (*Lynx rufus*).

3.5.2 Important Species

3.5.2.1 Recreationally and Commercially Important Species

Game species annually support a multi-million dollar recreation industry in the Rio Grande Valley (Collins, 1984). The major species of economic importance in this region are the white-winged dove and white-tailed deer (*Odocoileus virginianus*). Other game species include waterfowl, northern bobwhite, mourning dove, plain chachalaca (*Ortalis vetula*), and javelina (*Tayassu tajacu*).

Tourism is also a major industry in the region and birding is a favorite pastime of many visitors (FWS, 1987). A survey of the American Birding Association in 1993 revealed that Texas was the top birding destination in the U.S. (TPWD, 1999), and many birds found in the Lower Rio Grande Valley are found nowhere else in the country.

3.5.2.2 Endangered and Threatened Species

Both the FWS and TXBCD were contacted concerning protected species in Hidalgo County. Table 3-3 lists animal species with a geographic range that includes Hidalgo County and that are considered by the FWS or TPWD to be endangered, threatened, or SOC. Sources reviewed to develop the list include FWS (2002), TXBCD (2002), and Texas Organization for Endangered Species (TOES) (1995). It should be noted that inclusion on the list does not imply that a species is known to occur in the study area, but only acknowledges the potential for occurrence. Only those species listed as endangered or threatened by FWS are afforded complete federal protection.

Five taxa listed in Table 3-3 are considered by both the FWS and TPWD as endangered. These are the northern aplomado falcon (*Falco femoralis septentrionalis*), interior least tern (*Sterna antillarum athalassos*), ocelot (*Leopardus pardalis*), Gulf Coast jaguarundi (*Herpailurus yagouaroundi cacomitli*),

TABLE 3-2

MIGRATORY NON-GAME BIRDS OF CONSERVATION CONCERN
TAMAULIPAN BRUSHLANDS REGION[1]

Common Name[2]	Scientific Name[2]
Northern harrier	*Circus cyaneus*
Harris's hawk	*Parabuteo unicinctus*
Swainson's hawk	*Buteo swainsoni*
Peregrine falcon[3]	*Falco peregrinus*
Snowy plover	*Charadrius alexandrinus*
Mountain plover[4]	*Charadrius montanus*
Long-billed curlew	*Numenias americanus*
Stilt sandpiper	*Calidris himantopus*
Buff-breasted sandpiper	*Tryngites subruficollis*
Gull-billed tern	*Sterna nilotica*
Red-billed pigeon	*Patagioenas flavirostris*
Ferruginous pygmy-owl[3]	*Glaucidium brasilianum*
Elf owl	*Micrathene whitneyi*
Burrowing owl	*Athene cunicularia*
Buff-bellied hummingbird	*Amazilia yucatanensis*
Northern beardless-tyrannulet[3]	*Camptostoma imberbe*
Rose-throated becard[3]	*Pachyramphus algaiae*
Loggerhead shrike[5]	*Lanius ludovicianus*
Bell's vireo	*Vireo bellii*
Verdin	*Auriparus flaviceps*
Cactus wren	*Campylorhynchus brunneicapillus*
Curve-billed thrasher	*Toxostoma curvirostre*
Sprague's pipit	*Anthus spragueii*
Tropical parula[3, 5]	*Parula pitiayumi*
Cassin's sparrow	*Aimophila cassinii*
Lark bunting	*Calamospiza melanocorys*
Harris's sparrow	*Zonotrichia querula*
McCown's longspur	*Calcarius mccownii*
Chestnut-collared longspur	*Calcarius ornatus*
Pyrrhuloxia	*Cardinalis sinuatus*
Varied bunting	*Passerina versicolor*
Painted bunting	*Passerina ciris*
Dickcissel	*Spiza americana*
Hooded oriole[5]	*Icterus cucullatus*
Altamira oriole	*Icterus gularis*
Audubon's oriole[5]	*Icterus graduacauda*

[1] According to U.S. Fish and Wildlife Service (FWS) (2002b).
[2] Nomenclature follows AOU (1998, 2000, 2002, and 2003).
[3] Listed by TPWD as endangered or threatened.
[4] Previously listed by FWS as proposed threatened; notice published 9/9/03 to withdraw proposal.
[5] Listed by FWS as a species of concern (SOC).

TABLE 3-3

ENDANGERED, THREATENED AND RARE WILDLIFE SPECIES
OF POTENTIAL OCCURRENCE IN HIDALGO COUNTY, TEXAS[1]

Common Name[2]	Scientific Name[2]	Status[3]	
		FWS	TPWD
INVERTEBRATES			
Subtropical blue-black tiger beetle	*Cicindela nigrocoerula subtropica*	SOC	NL
Maculated manfreda skipper	*Stallingsia maculosus*	SOC	NL
AMPHIBIANS			
Black spotted newt	*Notophthalmus meridionalis*	SOC	T
Rio Grande lesser siren	*Siren intermedia texana*	SOC	T
Mexican treefrog	*Smilisca baudinii*	NL	T
White-lipped frog	*Leptodactylus labialis*	NL	T
Sheep frog	*Hypopachus variolosus*	NL	T
South Texas siren (large form)	*Siren* sp.[1]	NL	T
REPTILES			
Reticulate collared lizard	*Crotaphytus reticulatus*	SOC	T
Texas horned lizard	*Phrynosoma cornutum*	SOC	T
Texas tortoise	*Gopherus berlandieri*	NL	T
Speckled racer	*Drymobius margaritiferus*	NL	T
Texas indigo snake	*Drymarchon corais erebennus*	NL	T
Black striped snake	*Coniophanes imperialis*	NL	T
Northern cat-eyed snake	*Leptodeira septentrionalis*	NL	T
FISHES			
River goby	*Awaous tajasica*	NL	T
Bluntnose shiner (extirpated in Texas)	*Notropis simus simus*	NL	T
MOLLUSKS			
Texas hornshell	*Popenaias popeii*	C1	NL
BIRDS			
Northern aplomado falcon	*Falco femoralis septentrionalis*	E	E
Interior least tern	*Sterna antillarum athalassos*	E	E
Piping plover	*Charadrius melodus*	T	T
Bald eagle	*Haliaeetus leucocephalus*	T/PDL	T
American peregrine falcon	*Falco peregrinus anatum*	DL	E
Arctic peregrine falcon	*Falco peregrinus tundrius*	DL	T
Reddish egret	*Egretta rufescens*	SOC	T
White-faced ibis	*Plegadis chihi*	SOC	T
Northern gray hawk	*Asturina nitidus maximus*	SOC	T
Ferruginous hawk	*Buteo regalis*	SOC	NL
Tropical parula	*Parula pitiayumi*	SOC	T

TABLE 3-3 (CONCLUDED)

Common Name[2]	Scientific Name[2]	Status[3]	
		FWS	TPWD
Texas Botteri's sparrow	*Aimophila botterii texana*	SOC	T
Loggerhead shrike	*Lanius ludovicianus*	SOC	NL
Brownsville common yellowthroat	*Geothlypis trichas insperata*	SOC	NL
Texas olive sparrow	*Arremonops rufivirgatus rufivirgatus*	SOC	NL
Sennett's hooded oriole	*Icterus cucullatus sennetti*	SOC	NL
Audubon's oriole	*Icterus graduacauda*	SOC	NL
Wood stork	*Mycteria americana*	E[4]	T
Common black hawk	*Buteogallus anthracinus*	NL	T
White-tailed hawk	*Buteo albicaudatus hypospodius*	NL	T
Zone-tailed hawk	*Buteo albonotatus*	NL	T
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	E[5]	T
Northern beardless-tyrannulet	*Camptostoma imberbe*	NL	T
Rose-throated becard	*Pachyramphus aglaiae*	NL	T
MAMMALS			
Ocelot	*Leopardus pardalis albescens*	E	E
Gulf Coast jaguarundi	*Herpailurus yagouaroundi cacomitli*	E	E
Jaguar (extirpated in Texas)	*Panthera onca*	E	E
Coues' rice rat	*Oryzomys couesi aquaticus*	SOC	T
Southern yellow bat	*Lasiurus ega*	NL	T
White-nosed coati	*Nasua narica*	NL	T

[1] According to FWS (2002a), TXBCD (2003).

[2] Nomenclature follows Correll and Johnston (1979), Hubbs et al. (1991), Manning and Jones (1998), AOU (1998, 2000, 2002, and 2003), Crother et al. (2000 and 2001), FWS (2002a), and TXBCD (2003).

[3] FWS – U.S. Fish and Wildlife Service.

TPWD – Texas Parks and Wildlife Department.

E – Endangered.

E[4] – Federally listed as endangered only in Alabama, Florida, Georgia, and North and South Carolina, not federally listed in Texas.

E[5] – Federally listed as endangered only in Arizona, not federally listed in Texas.

T – Threatened.

PT – Species proposed for listing as threatened.

T/PDL – Currently listed as Threatened, but proposed for delisting.

DL – Formerly listed as threatened or endangered, but due to significant population increases, has officially been removed from threatened or endangered status.

NL – Not listed.

SOC – FWS Species of Concern; species for which there is some evidence of vulnerability, but not enough data to support listing at this time.

C1 – Candidate for federal listing.

and jaguar (*Panthera onca* — extirpated in Texas). The FWS and TPWD list the piping plover (*Charadrius melodus*) as threatened. The bald eagle (*Haliaeetus leucocephalus*) is state listed and federally listed as threatened but has been proposed to be removed from the federal endangered and threatened species list. The mountain plover (*Charadrius montanus*) had been proposed for listing as threatened by the FWS, but a notice was published on September 9, 2003, to withdraw the proposal. The Texas hornshell (*Popenaias popeii*) has not been proposed for listing, but is currently a candidate for listing by the FWS.

The northern aplomado falcon is a small raptor that inhabits savannahs and open woodlands, nesting on tall platforms such as branches and utility poles, and often uses other raptors' nests (Hector, 1981; FWS, 1995). The species was apparently extirpated as a breeding bird within Texas and the U.S. and the last breeding record was for Deming, New Mexico in 1952 (Oberholser, 1974). Successful efforts have been made for the reintroduction of the aplomado falcon at more than a dozen sites along the Texas Gulf Coast from Calhoun County to Cameron County (Peregrine Fund, 2002). Since 1985, over 100 aplomado falcons have been released at the Laguna Atascosa NWR in an effort to reintroduce the species (*Austin American-Statesman*, 1996). In 1995, a pair of these released birds successfully nested on a transmission line pole near Brownsville. In 1996, this same pair nested in a nearby mesquite, but the female and young were subsequently killed by a great horned owl (*Bubo virginianus*) (*Austin American-Statesman*, 1996). This falcon is now considered a rare summer resident in the Lower Rio Grande Valley and the Trans-Pecos (Texas Ornithological Society (TOS), 1995). There is no suitable habitat for this species within the study area and it is unlikely that this species would occur there.

The interior least tern historically nested in Texas on sandbars of the Colorado River, Red River, and Rio Grande. The interior least tern's preferred habitat is bare, frequently flooded sand flats, salt flats, sand and gravel bars, and beaches of sand, shell or gravel (Campbell, 1995; Thompson et al., 1997). Small remnant breeding populations persist at isolated locations within the species' historic range, and it winters along the entire Texas Gulf Coast. There are no official records of interior least terns in Hidalgo County (Oberholser, 1974) and the species is identified as an uncommon migrant in the region (TOS, 1995). The closest recorded interior least tern nesting locations are along the shores of Lake Amistad, Val Verde County, approximately 300 miles northwest of the study area (FWS, 1990). No known nesting sites occur in Hidalgo County, but the species is listed as an occasional visitor to nearby Santa Ana NWR (FWS, 1999). This species is not expected to nest within the study area, but may occur in appropriate habitat during migration.

The ocelot is a medium-sized cat that historically inhabited dense thornscrub and thickets in south Texas, the Gulf Coast, and the Big Thicket of east Texas (Davis and Schmidly, 1994). Today, ocelots are restricted to small, remnant patches of dense thornscrub in the Lower Rio Grande Valley (Davis and Schmidly, 1994). Approximately 100 ocelots are thought to still occur in Texas (Laack, 1998). One or two ocelots presumably occur at Santa Ana NWR (Benn, 1997; Laack, 1998). Ocelot sightings have also been reported from the LRGV NWR (Benn, 1997). Ocelots may occur in the NWR tracts in the study area

and there is a remote possibility that they may traverse other portions of the study area between areas of suitable habitat or while dispersing from existing territories.

The jaguarundi is a rare, small slender-bodied cat that inhabits dense thornscrub and brushland in Cameron, Hidalgo, Starr, and Willacy counties (Davis and Schmidly, 1994). Unconfirmed jaguarundi sightings in Hidalgo County include Bentsen-Rio Grande State Park, Santa Ana NWR, LRGV NWR, Cimarron Country Club, Wimberley Ranch, and the Anacua Unit of TPWD's Las Palomas Wildlife Management Area (Prieto, 1990, 1991; Benn, 1997). Recent (March 1998) jaguarundi sightings have been reported from Santa Ana NWR (Santa Ana NWR data). The TXBCD (2003) shows a documented field observation of the jaguarundi in the Gabrielson Tract of the LRGV NWR, which is located in the southwestern corner of the study area. Jaguarundis may occur in dense brushlands within the study area and there is a remote possibility that they may traverse other portions of the study area while traveling between areas of suitable habitat or while dispersing from existing territories.

The jaguar is a large cat that was once fairly common in dense chaparral and timbered sections of southern and eastern Texas, north to the Red River (Davis and Schmidly, 1994). Jaguars were last recorded in Texas in the early 1900s and the species is considered extirpated from the state (Davis and Schmidly, 1994).

The bald eagle is present in Texas year-round, and may be found breeding, wintering, and during migration. In Texas, bald eagles breed along the Gulf Coast and on major inland lakes and reservoirs. Additional numbers of bald eagles winter in these habitats. Bald eagles prefer large bodies of water surrounded by tall trees or cliffs, which are used as nesting sites. No bald eagle nests are known to occur in Hidalgo County (Ortego, 2001); however, the study area is within the general distribution pattern of this species, and occasional visitors to the region are possible. Suitable habitat occurs along the Rio Grande; however, this species would be expected only as a rare migrant or winter visitor.

In Texas, the piping plover inhabits coastal beaches and tidal flats. Approximately 35% of the known population of piping plovers winters along the Texas Gulf Coast, where they spend 60 to 70% of the year (Campbell, 1995). The population of piping plovers that winter in Texas breeds on the northern Great Plains and the Great Lakes. The species is considered a rare to uncommon migrant and winter resident in coastal areas of south Texas (TOS, 1995; McKinney, 2002). The piping plover is considered an accidental spring migrant/winter resident at Santa Ana NWR, but has not been recorded within the study area (FWS, 1999; TXBCD, 2003). This species may occur in the study area as a rare migrant.

The Texas hornshell is considered a candidate for listing by the FWS. This mollusk has a limited distribution in Texas with known occurrences from the Rio Grande River to the Pecos River, San Francisco Creek in the Big Bend area, the Devils River, and the Rio Salado in Mexico (Howells et al., 1996). Although little information is available for this species, Howells et al. (1996) consider loss of

habitat combined with a deterioration in water quality to have contributed to the decline of the Texas hornshell. It is very unlikely for this freshwater species to occur in the study area.

While not listed or proposed for listing by the FWS, 17 taxa in Table 3-3 are identified as SOC by the FWS. These include two insects, the subtropical blue-black tiger beetle (*Cicindela nigrocoerula subtropica*) and maculated manfreda skipper (*Stallingsia maculosus*); two amphibians, the black spotted newt (*Notophthalmus meridionalis*) and Rio Grande lesser siren (*Siren intermedia texana*); two reptiles, the reticulate collared lizard (*Crotaphytus reticulatus*) and Texas horned lizard (*Phrynosoma cornutum*); 11 birds, the reddish egret (*Egretta rufescens*), white-faced ibis (*Plegadis chihi*), northern gray hawk (*Asturina nitidus maximus*), ferruginous hawk (*Buteo regalis*), tropical parula (*Parula pitiayumi*), Texas Botteri's sparrow (*Aimophila botterii texana*), loggerhead shrike (*Lanius ludovicianus*), Brownsville common yellowthroat (*Geothlypis trichas insperata*), Texas olive sparrow (*Arremonops rufivirgatus rufivirgatus*), Sennett's hooded oriole (*Icterus cucullatus sennetti*), and Audubon's oriole (*Icterus graduacauda*); and one mammal, Coues' rice rat (*Oryzomys couesi aquaticus*). Of these, the black spotted newt, Rio Grande lesser siren, reticulate collard lizard, Texas horned lizard, reddish egret, white-faced ibis, northern gray hawk, tropical parula, Texas Botteri's sparrow, and Coues' rice rat are also state-listed as threatened.

The subtropical blue-black tiger beetle is a predaceous insect that typically occurs during summer months in open, sunny areas. Common habitats are alkali, or wet soil locations along water sources (Hoback and Riggins, 2001). Their larvae live in vertical subterranean burrows on dry paths, in fields, or along sandy shorelines (TXBCD, 2002). According to the FWS and TXBCD, it is of potential occurrence in the study area.

The maculated manfreda skipper is a rare butterfly known from northern Mexico and several south Texas counties, including Hidalgo County. Maculated manfreda skippers inhabit subtropical thornscrub and pine forest (Opler, 1998). The larvae are closely associated with the plant Texas tuberose (*Manfreda maculosus*), which grows on prairies and chaparral-covered hills of the Rio Grande Valley and plains (Tilden and Smith, 1986; Correll and Johnston, 1979). This species may occur in the study area within native plant communities.

The black-spotted newt is primarily aquatic and inhabits heavily vegetated, shallow-water lagoons, streams, ditches, and swamps along the coastal plains of south Texas (Garrett and Barker, 1987). The species has been recorded from the Mission Main Canal, located approximately 2.4 km (1.5 miles) east of the study area (TXBCD, 2003), and may be present in the study area where appropriate habitat occurs.

The Rio Grande lesser siren is a large aquatic species that inhabits warm, densely vegetated shallow waters, including muddy ponds, lakes, marshes, and irrigation ditches of the Lower Rio Grande Valley (Garrett and Barker, 1987). Although the species is known from Hidalgo County (Dixon, 2000), there are

no recorded occurrences of the species within the study area (TXBCD, 2003). Rio Grande lesser sirens may be present in the study area where appropriate habitat occurs.

The reticulate collared lizard inhabits riverine brushland and arroyo banks in the western portions of south Texas, from Hidalgo County north to Uvalde County (Garrett and Barker, 1987). Although the species is known from Hidalgo County (Dixon, 2000), there are no recorded occurrences of the species within the study area (TXBCD, 2003). Reticulate collared lizards may be present in the study area where appropriate habitat occurs.

The Texas horned lizard is found throughout the western two-thirds of the state in a variety of habitats, but prefers arid to semi-arid habitats in sandy loam or loamy sand soils that support patchy bunch-grasses, cacti, yucca, and various shrubs (Henke and Fair, 1998; Dixon, 2000). Although the species is known from Hidalgo County (Dixon, 2000), there are no recorded occurrences of the species within the study area (TXBCD, 2003). Texas horned lizards may be present in the study area where appropriate habitat occurs.

The reddish egret is a resident of brackish marshes, tidal flats, and shallow salt lakes along the Texas Gulf Coast (TXBCD, 2002). They nest in brushy yucca and prickly pear thickets on dry coastal islands (Oberholser, 1974). Reddish egrets are considered rare winter visitors to inland portions of the Lower Rio Grande Valley and they have been recorded at nearby Santa Ana NWR (McKinney, 2002, FWS, 1999). There is a slight possibility that the species could use project area ponds as stopover points during post-breeding.

The white-faced ibis is a medium-sized wading bird that inhabits freshwater marshes, sloughs, and irrigated rice fields, but may also be found in brackish and saltwater habitats. White-faced ibis are permanent residents along the Texas Gulf Coast; however, nesting records exist for many scattered inland localities (TOS, 1995). The species is a rare to uncommon migrant throughout the state and may occasionally be found as a post-breeding visitor north and west of its typical range. The species has been recorded in Hidalgo County, including nearby Santa Ana NWR (Oberholser, 1974, FWS, 1999). There is a slight possibility that the species could use project area ponds as stopover points during spring and fall migration or during post-breeding.

The northern gray hawk, a subspecies of gray hawk, is a neotropical raptor whose range reaches its northern-most limits along the U.S.-Mexico border. Gray hawks inhabit mature riparian woodlands and nearby mesquite and scrub grasslands (Oberholser, 1974). Formerly more common and widespread along the lower Rio Grande, this species is now an uncommon local resident in remnant riparian woodlands in the Lower Rio Grande Valley. The species has been recorded nesting at Anzalduas County Park in the southwest portion of the study area (Sarkozi, 2002; TXBCD, 2003).

The ferruginous hawk inhabits open plains, grasslands, and woodland edges throughout the western half of the U.S. (Oberholser, 1974; Clark and Wheeler, 2001). In Texas, ferruginous hawks are rare summer

residents in the western Panhandle and rare to locally common winter residents in the remainder of the state, being locally uncommon in the south Texas plains (TOS, 1995). A ferruginous hawk was reported from the Santa Ana NWR in April 1998 (Santa Ana NWR data). This species could possibly occur within the study area as a rare migrant or winter visitor.

The tropical parula is a small passerine that nests in bottomland forests, selecting sites where trees are covered in epiphytic Spanish moss (*Tillandsia usneoides*) and gray-green lichen (*Usnea* sp.), which are used as nest material (Oberholser, 1974; TOS, 1995; Regelski and Moldenhauer, 1997). Tropical parulas have nested at Santa Ana NWR and there are winter and spring records of the species from Anzalduas County Park in the southwest portion of the study area (FWS, 1999; Sarkozi, 2002).

Texas Botteri's sparrow, a subspecies of Botteri's sparrow, is largely restricted to bunch-grass prairies and grasslands on the lower coastal plain from Kenedy County south to Cameron County (Oberholser, 1974; TOS, 1995). It is a locally common nesting bird in Spartina-dominated grasslands of Cameron and Willacy counties and may possibly occur in grassland habitats within Hidalgo County. This species, however, is not likely to frequent the study area because of the general absence of suitable habitat.

The loggerhead shrike is a small predatory bird that inhabits open or semi-open country with scattered trees and shrubs, including agricultural fields, savannah, desert scrub, and occasionally open woodlands. Loggerhead shrikes hunt for insects, and small birds and rodents, which they impale on sharp objects like cactus spines and mesquite thorns, and the barbs of barbed-wire fences. The loggerhead shrike is a rare to common resident throughout Texas, except for portions of the South Texas Plains (TOS, 1995). Local populations are often increased by an influx of wintering birds (TOS, 1995). In the Lower Rio Grande Valley, loggerhead shrikes are common migrants and winter residents (McKinney, 2002). Loggerhead shrikes have been observed in the study area and are likely to occur in the study area where appropriate habitat occurs.

The Brownsville common yellowthroat, a subspecies of the common yellowthroat, was once a fairly common migrant/winter resident in southern Texas, including Hidalgo County (Oberholser, 1974). This species, however, has become increasingly rare. The common yellowthroat typically inhabits marshes, especially cattail (*Typha* spp.) thickets near water, bogs, brushy pastures, and old fields. It is more widespread in marshy, brushy, and weedy areas during migration and winter (American Ornithologists' Union (AOU), 1998; Guzy and Ritchison, 1999). This species may be present in the study area where appropriate habitat occurs.

The Texas olive sparrow, a subspecies of olive sparrow, is a common resident in southern Texas, inhabiting tropical hardwood forests, arid lowland scrub, and riparian thickets (TOS, 1995; Brush, 1998). This species is a common year-round resident in woodlands in Hidalgo County (Oberholser, 1974, McKinney, 2002) and may be present in the study area where appropriate habitat occurs.

Sennett's hooded oriole, a subspecies of hooded oriole, is a rare to locally common summer resident along the Rio Grande from El Paso south through the lower Rio Grande Valley, north to the southern edge of the Edwards Plateau and east to Nueces County (TOS, 1995). In Texas, their preferred habitat is mesquite brush and Texas ebony woodland, but they also commonly nest in palm trees (*Sabal* spp. and *Washingtonia* spp.) (Pleasants and Albano, 2001). Hooded orioles have been recorded at nearby Santa Ana NWR (FWS, 1999) and may be present in the study area where appropriate habitat occurs.

Audubon's oriole is a rare to uncommon year-round resident in south Texas, north to Duval, Goliad, and Val Verde counties (TOS, 1995). Audubon's orioles typically inhabit dense woodland and thickets along watercourses (Oberholser, 1974; TXBCD, 2002). The species has been recorded at nearby Santa Ana NWR (FWS, 1999) and may be present in the study area where appropriate habitat occurs.

Coues' rice rat is a Mexican species whose range reaches into south Texas, where it occurs in Hidalgo and Cameron counties (Davis and Schmidly, 1994). In Hidalgo County, they have been captured in cattail and bulrush (*Scirpus* spp.) dominated marshes, as well as in grassy areas near resacas (oxbow lakes) (Davis and Schmidly, 1994). Coues' rice rat has been recorded from the Santa Ana NWR (Santa Ana NWR data) and may be present in the study area where appropriate habitat occurs. The remaining 22 taxa, listed on Table 3-3, are neither federally listed in Texas nor SOC, but are state-listed as threatened. These are: the Mexican treefrog (*Smilisca baudinii*), white-lipped frog (*Leptodactylus labialis*), sheep frog (*Hypopachus variolosus*), South Texas siren (large form) (Siren sp.1), Texas tortoise (*Gopherus berlandieri*), speckled racer (*Drymobius magaritiferus*), Texas indigo snake (*Drymarchon corais erebennus*), black-striped snake (*Coniophanes imperialis*), northern cat-eyed snake (*Leptodeira septentrionalis septentrionalis*), river goby (*Awaous tajasica*), bluntnose shiner (*Notropis simus simus*), American peregrine falcon (*Falco peregrinus anatum*), arctic peregrine falcon (*Falco peregrinus tundrius*), wood stork (*Mycteria americana*), common black-hawk (*Buteogallus anthracinus*), white-tailed hawk (*Buteo albicaudatus*), zone-tailed hawk (*Buteo albonotatus*), cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*), northern beardless-tyrannulet (*Camptostoma imberbe*), rose-throated becard (*Pachyramphus aglaiae*), southern yellow bat (*Lasiurus ega*), and white-nosed coati (*Nasua narica*).

The Mexican treefrog inhabits humid microhabitats within arid and semiarid regions of extreme south Texas (Garrett and Barker, 1987). Typical habitat includes wooded areas along streamsides, resacas, and roadside ditches. The species has been recorded in Hidalgo County (Dixon, 2000); however, no known records exist from the study area (TXBCD, 2003). Mexican treefrogs may be present in the study area where appropriate habitat occurs.

The white-lipped frog is a nocturnal species that inhabits irrigated fields, irrigation ditches, low grasslands, and runoff areas in the extreme southern portions of the Lower Rio Grande Valley (Garrett and Barker, 1987; TXBCD, 2002). The species has been recorded in Hidalgo County (Dixon, 2000);

however, no known records exist from the study area (TXBCD, 2003). White-lipped frogs may be present in the study area where appropriate habitat occurs.

The sheep frog is a secretive species found in extreme south Texas (Garrett and Barker, 1987). Sheep frogs prefer moist habitats in arid areas, including rodent burrows and fallen trees, as well as pond edges and irrigation ditches (Garrett and Barker, 1987; TXBCD, 2002). The species has been recorded in Hidalgo County (Dixon, 2000) and there is a known record from the Edinburg Main Canal, approximately 5.6 km (3.5 miles) northeast of the study area (TXBCD, 2003). Sheep frogs may be present in the study area where appropriate habitat occurs.

The South Texas siren is a large aquatic species that inhabits arroyos, canals, ditches, and shallow depressions in south Texas, south of the Balcones Escarpment (TXBCD, 2002). This species is not well understood and warrants further evaluation to determine its status as a species. There is a known record of South Texas siren from Sardina Resaca approximately 1.3-km (0.8-mile) north of the study area (TXBCD, 2003). The species may be present in the study area where appropriate habitat occurs.

The Texas tortoise is a terrestrial turtle that inhabits sandy soils in areas of low, sparse vegetation throughout the southern portion of the state (Garrett and Barker, 1987). Texas tortoises may burrow in the sand or enter animal burrows, but typically seek cover in a shallow scrape under shrubs or cacti. The species has been recorded in Hidalgo County (Dixon, 2000); however, no known records exist from the study area (TXBCD, 2003). Texas tortoises may be present in the study area where appropriate habitat occurs.

The speckled racer is a tropical nonvenomous snake whose range reaches into extreme south Texas, where it occurs in Hidalgo and Cameron counties (Werler and Dixon, 2000). They are rare in Texas and occur only in native subtropical woodlands, which is extremely restricted in extent. The National Audubon Society's Sabal Palm Sanctuary is thought to have the largest population of speckled racers in Texas (Werler and Dixon, 2000). Speckled racers inhabit dense riparian woodlands and thickets and groves of Texas palm (*Sabal texana*). The species has been recorded in Hidalgo County (Dixon, 2000), and they may be present in the study area where appropriate habitat occurs.

The Texas indigo snake is a large, powerful nonvenomous snake that occurs in thornscrub and woodlands throughout south Texas, north to the southern Edwards Plateau and east along the Nueces River (Werler and Dixon, 2000). This species is found in a variety of habitats, but requires moist microhabitats including streamsides, ponds and tanks, resacas, and windmills (Werler and Dixon, 2000). The species has been recorded in Hidalgo County (Dixon, 2000), and they may be present in the study area where appropriate habitat occurs.

The black-striped snake is a mildly venomous, rear-fanged snake that occurs in the extreme south of Texas, including Cameron, Willacy, and Hidalgo counties (Werler and Dixon, 2000). Black-striped snakes seek cover in warm, moist microhabitats, particularly in sandy soils or under other available cover

such as cacti, palm fronds, logs, or construction debris (Tennant, 1985). The species has been recorded in Hidalgo County (Dixon, 2000), and TXBCD (2003) indicates a record from the Edinburg Main Canal, approximately 5.6 km (3.5 miles) northeast of the study area. Black-striped snakes may be present in the study area where appropriate habitat occurs.

The northern cat-eyed snake is a mildly venomous, rear-fanged snake that inhabits thornscrub and woodlands in Cameron, Willacy, Hidalgo, and Kenedy counties (Werler and Dixon, 2000). Northern cat-eyed snakes typically inhabit moist microhabitats, particularly dense vegetation adjacent to ponds, streams, and other water bodies (Tennant, 1985; Werler and Dixon, 2000). The species has been recorded in Hidalgo County (Dixon, 2000) and may be present in the study area where appropriate habitat occurs.

The river goby occurs along the Atlantic and Gulf coasts of the U.S. In Texas, this species is known only from Hidalgo and Willacy counties; however, it is very rare in the Rio Grande, apparently reaching the northern edge of its distribution in this stream (Hubbs et al., 1991). Habitat includes lakes, ponds, rivers and streams, brackish and estuarine areas, occurring only in brackish water in seasonally intermittent streams (Watson, 1996). TXBCD (2003) indicates a record from just below Anzalduas Dam, within the study area.

The Texas subspecies of bluntnose shiner once occurred throughout the Rio Grande basin, but has not been recorded since 1964 and is now thought to be extinct (Hubbs et al., 1991). A second subspecies (*Notropis simus pecosensis*) still occurs in the Pecos River basin in New Mexico. This species is thought to be extinct, therefore, it is not expected to occur within study area waters.

Two subspecies of peregrine falcon are listed in Table 3-2. The American peregrine falcon is a rare migrant statewide, and nests in the mountains of Trans-Pecos Texas (TOS, 1995). The arctic peregrine falcon is an uncommon migrant statewide and an uncommon winter resident in the Lower Rio Grande Valley (TOS, 1995). The peregrine falcon was recently removed from the FWS list of endangered species, but the American and arctic subspecies retain their state-listed status as endangered and threatened, respectively. Padre Island is the most important known staging area for migrant peregrine falcons in the Western Hemisphere (Morizot and Maechtle, 1987). Peregrine falcons have been reported from Santa Ana NWR (Santa Ana NWR data). Because of the relative proximity of the study area to South Padre Island, peregrine falcons could occasionally occur within the study area, particularly during the spring and fall migrations.

The wood stork is an uncommon to locally common post-breeding visitor (probably from the Mexican population) to coastal Texas and inland waters in east and central Texas (TOS, 1995). Wood storks formerly bred in North America along the Gulf coast from east Texas to Florida, but their range has been significantly reduced since the 1960s and their North American breeding range is now restricted to Florida, Georgia, and South Carolina (Oberholser, 1974; Coulter et al., 1999). In Texas, wood storks are typically found in the vicinity of freshwater or saltwater wetlands, lakes, or along rivers and streams.

Wood storks are federally listed as endangered in Florida, Alabama, Georgia, North Carolina, and South Carolina, but not in Texas. The species has been recorded in Hidalgo County (Oberholser, 1974), and individuals have been recorded from the Santa Ana NWR during the summer, spring and fall (FWS, 1999). There is a possibility that wood storks could occur in the study area as post-breeding visitors; however, suitable foraging and roosting habitat for this species is extremely limited within the study area.

The common black-hawk is described as rare in south Texas (Schnell et al., 1988; McKinney, 2002). According to Oberholser (1974) the last confirmed nesting of this species in the Lower Rio Grande Valley occurred in Cameron County in 1937, and breeding populations have probably been extirpated in the area as a result of desiccation in the valley. Breeding birds formerly occurred in willow groves along the Rio Grande floodplain in southern Starr, Hidalgo, and Cameron counties. Recent sightings have generally been in the Laguna Madre vicinity on coastal prairie. This species is considered rare (seen every two to five years) in the fall, winter, and spring at nearby Santa Ana NWR; several sightings occurred there in April 1998 (Santa Ana NWR data). This species is not expected to occur within the study area.

The white-tailed hawk is an uncommon local resident on the Gulf coastal plain, from Harris County south to the Rio Grande (TOS, 1995). White-tailed hawks inhabit coastal prairies and brushlands, as well as inland mesquite and oak savannahs (TXBCD, 2002). The species is listed as an occasional visitor to inland areas of the Lower Rio Grande Valley, but is listed as a rare year-round visitor to nearby Santa Ana NWR (FWS, 1999; McKinney, 2002). This species may occasionally occur within the study area.

The zone-tailed hawk is a rare to uncommon breeding bird in the Trans-Pecos and Edwards Plateau regions of Texas (Oberholser, 1974). No verified breeding records exist for Hidalgo or adjacent counties (Oberholser, 1974). This species is considered accidental in summer and rare in winter at the Santa Ana NWR (FWS, 1999). In July 2003, a zone-tailed hawk was recorded at Anzalduas County Park (Clark, 2003). The zone-tailed hawk may occur in the study area as an accidental visitor.

In Texas, the cactus ferruginous pygmy-owl inhabits mesquite-ebony thornscrub and ranges from the Lower Rio Grande Valley north into Kenedy County (Oberholser, 1974; TOS, 1995). The species is listed by FWS as endangered in Arizona, but is recognized as a SOC in Texas. It is a rare, year-round resident at Santa Ana NWR (FWS, 1999). Ferruginous-pygmy owls may occur in the study area where suitable brushland habitat is present.

The northern beardless-tyrannulet is a small neotropical flycatcher that is a rare to locally uncommon resident in the Lower Rio Grande Valley (TOS, 1995). The species prefers mesquite woodlands, but is also found along the Rio Grande in riparian woodlands (Oberholser, 1974). Northern beardless-tyrannulets have been recorded at Anzalduas County Park (Sarkozi, 2002) and may be present elsewhere in the study area where appropriate habitat occurs.

The rose-throated becard is a medium-sized neotropical flycatcher that was formerly a rare resident in the Lower Rio Grande Valley, but is now typically a rare winter visitor to the region (TOS, 1995). The

species inhabits riparian woodlands, where it commonly nests in Montezuma baldcypress (*Taxodium mucronatum*), black willow, and sycamore (*Platanus occidentalis*). Recent nesting records exist from Anzalduas County Park (Sarkozi, 2002; TXBCD, 2003), therefore, the species may be present elsewhere in the study area where appropriate habitat occurs.

The southern yellow bat is a neotropical bat that is widespread in Mexico and South America, but has also been recorded in southern Arizona, southwestern New Mexico, and south Texas. Most of the specimens collected in Texas are from along the Rio Grande in Cameron County, but they have been collected as far north as Corpus Christi in Nueces County (Spencer et al., 1988; Schmidly, 1991). The southern yellow bat is a migratory species but is a permanent resident in Texas (Schmidly, 1991). They are a tree-roosting species, commonly roosting in palm trees. All of the specimens collected in Texas have been from palm groves or isolated palm trees. This species may be present in the study area where suitable roost sites are available.

The white-nosed coati is a raccoon-like (Procyonid) carnivore that inhabits woodlands from Central America and Mexico north to south Texas. In Texas white-nosed coatis are rare inhabitants from extreme south Texas (Cameron Co.) to the Big Bend region, with records from Aransas, Brewster, Cameron, Hidalgo, Kerr, Maverick, Starr, Uvalde, and Webb counties (Davis and Schmidly, 1994). This species may be present in the study area where appropriate habitat occurs.

3.5.2.3 Critical Habitat

Under the federal ESA, the Secretary of the Interior may designate "critical habitat" for an endangered or threatened species. The ESA defines critical habitat as ". . . the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of this Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species at the time it is listed . . . upon a determination by the Secretary that such areas are essential for the conservation of the species." No such designated critical habitat occurs within the study area.

3.6 AQUATIC ECOLOGY

3.6.1 Aquatic Habitats and Species

As noted above, the study area lies within the Tamaulipan Biotic Province. Although the various biotic provinces were originally separated on the basis of terrestrial animal distributions, Hubbs (1957) has shown that the distribution of freshwater fishes within the state generally coincides with the terrestrial-vertebrate province boundaries, although northeast Texas and the coastal zone show a number of departures from this general rule.

The natural flow in the Rio Grande has been greatly altered by upstream impoundments and diversionary floodways leading to the coastline. Flow in the river is composed mainly of precipitation from local rains, irrigation runoff, and effluent from upstream municipalities in both Texas and Mexico (Breur, 1970).

The aquatic biota comprise the living portion of the aquatic ecosystem, interacting through their preferred habitats and positions in the food web. Analysis of aquatic systems is usually approached through the better-understood elements phytoplankton (and/or periphyton), zooplankton, benthos, and fish.

Phytoplankton, the microscopic algal forms suspended in the water column, is usually a major component of the aquatic food chain in an impoundment. In flowing waters, however, phytoplankton has more difficulty in maintaining substantial populations, and much of the organic input in riverine systems is frequently due to washed-in organic material and sometimes aquatic macrophytes. Under eutrophic conditions, reservoir phytoplankton can adversely affect water quality by forming slime or scum, producing unpleasant tastes and odors, and increasing the organic load sinking into the deep hypolimnion during stratification periods. Nuisance blooms are frequently due to blue-green algae (Cyanobacteria), although numerous other forms can reach nuisance levels.

The zooplankton forms an important part of the food chain in reservoirs and in many slow-flowing waters. Zooplankton feeds on phytoplankton, detrital particles, bacteria, protozoa, and other zooplankton, and in turn is preyed upon by macroinvertebrates and numerous fish species. Rotifers are generally the dominant zooplankton in larger rivers and are also abundant in lakes and reservoirs. Cladocerans and copepeds are relatively less common in flowing water and reach substantial concentrations only in a lake or reservoir environment.

The benthic macroinvertebrates of freshwater systems form a highly diverse group of organisms with a wide variety of functions in the aquatic community. In addition to serving as a major food source for vertebrate predators such as fish, macroinvertebrates have important roles as herbivores, detritivores, and carnivores. The major groups generally included in the macroinvertebrate category are the Insecta (particularly immature forms), Mollusca (mussels and snails), Oligochaeta (aquatic earthworms) and Crustacea (crawfishes and shrimp). The composition of macroinvertebrates in flowing waters is greatly influenced by the substratum type. Clinging and hiding forms occur in rocky areas of larger particle size, while burrowing forms are more common in sandy, silt-covered, and muddy bottoms. The greatest diversity generally occurs on rocky substrates. Many species require a current to satisfy food and respiratory needs, and cannot survive in a standing-water environment. The unionid mussels, crawfishes, prosobranch snails and the larvae of mayflies, stone flies, caddisflies and dobsonflies, usually reach maximum development in running waters. Generally, in ponds and resacas, the greatest diversity of macroinvertebrates is found along the shallow, vegetated littoral zones. A decline in diversity is typically noted in the deep benthos found in the soft bottom of Texas reservoirs, although the species that are present frequently reach substantial numbers. Various investigations have shown that the characteristic dominants of deeper zones are fly larvae and sometimes oligochaete worms. Some members of the deep

benthos are tolerant of low oxygen levels. *Tubifex* (an oligochaete) can persist under near-anoxic conditions, and very high densities of this genus may be an indication of organic pollution.

Fish are prominent in the trophic structure of most aquatic habitats, being the largest and most conspicuous of the ecosystem's resident consumers. Extensive environmental changes in an area can lead directly or indirectly to changes in the feeding habits of fish. However, changes in available feeding levels are not necessarily detrimental, unless the organism's feeding habits are very specialized. Food habits of fish vary with season, food availability and life cycle stages. For example, the diet of most young fish consists of microscopic plants and animals including algae, protozoans and crustaceans found on plants, in bottom material or suspended in the water column. As fish develop and attain sexual maturity, feeding adaptations develop and the diets of some species become very restricted. Some fish are herbivorous, while others (e.g., bass) are strictly carnivorous. Most of the sunfish and catfish are omnivorous.

Two indigenous fish assemblages occur in the Rio Grande drainage: one is upstream and composed mostly of freshwater species, and the other is downstream and composed of a mixture of the upstream species and estuarine and marine species. According to fish distribution data available for the Rio Grande drainage, 149 species have been recorded between Lake Amistad and the Gulf of Mexico (Espey, Huston & Associates, Inc. (EH&A), 1988). Flowing aquatic systems of the area appear to be restricted to the Rio Grande. The freshwater fauna is probably composed largely of small forage fish assemblages such as the Tamaulipas shiner (*Notropis braytoni*), red shiner (*Cyprinella lutrensis*), inland silverside (*Menidia beryllina*), sheepshead minnow (*Cyprinodon variegatus*), mosquitofish (*Gambusia affinis*), sailfin molly (*Poecilia latipinna*), threadfin shad (*Dorosoma petenense*), and gizzard shad (*Dorosoma cepedianum*). Other commonly encountered species include catfishes (Ictaluridae), common carp (*Cyprinus carpio*), buffalo (*Ictiobus* spp.), striped mullet (*Mugil cephalus*), the Mexican tetra (*Astyanax mexicanus*), and sunfishes (Centrarchidae).

3.6.2 Important Species

3.6.2.1 Recreationally and Commercially Important Species

No commercial fishing occurs in the study area. Sunfish, which are common in the Rio Grande watershed, offer limited recreational potential. Seven species of sunfish may occur, including the warmouth (*Lepomis gulosus*), green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), and longear sunfish (*Lepomis megalotis*). The largemouth bass (*Micropterus salmoides*) and white crappie (*Pomoxis annularis*) are known from the area, as well as five species of catfish. Only two of the catfish species are considered desirable by fishermen: the channel catfish (*Ictalurus punctatus*) and flathead catfish (*Pylodictis olivaris*).

3.6.2.2 Endangered and Threatened Species

Aquatic endangered and threatened species have been addressed in Section 3.5.2.2 of this report.

3.7 SOCIOECONOMICS

3.7.1 Regional Social and Economic Characteristics

The study area is located in southern Hidalgo County and includes portions of the cities of Granjeno, Mission, and McAllen, as well as the community of Madero. Economic and demographic characteristics for Hidalgo County were determined through a literature survey that included publications of the Texas Workforce Commission (TWC), Texas State Data Center (TSDC), U.S. Bureau of the Census (USBOC), TWDB, and the Texas Comptroller of Public Accounts (TCPA). Due to the inclusion in the study area of portions of the cities of Granjeno, Mission, and McAllen, these municipalities are included in the following discussions. No published data was available for Madero.

3.7.1.1 Population Trends

The study area lies within a region that has experienced one of the strongest growth rates in the United States. The McAllen-Edinburg-Mission Metropolitan Statistical Area (MSA) ranked as the fourth fastest growing MSA in the nation between 1990 and 2000 with a growth rate of nearly 49% (USBOC, 2001). Additionally, Hidalgo County ranked as the 12th fastest growing county in the state, and the 88th fastest growing county in the nation between July 2001 and July 2002 (USBOC, 2003).

As shown in Table 3-4, Hidalgo County's 2000 population of 569,463 more than doubled its 1980 population of 283,229. While the 2000 state population increased by approximately 20% over 1990 levels, the population in Mission and McAllen increased by 59% and 27%, respectively. The City of Granjeno's population was recorded at 313 in 2000 (USBOC, 1983, 1990, 2000).

Population forecasts provided by the TWDB predict continued steady growth within the region. Hidalgo County is expected to reach a population of 744,258 by 2010 while Mission and McAllen are predicted to increase to approximately 61,154 and 127,458, respectively. By 2020, the population in Hidalgo County is predicted to approach 1 million (TWDB, 2003).

3.7.1.2 Environmental Justice

This section was prepared in compliance with EO 12898, Federal Action to Address Environmental Justice (EJ) in Minority Populations and Low-Income Populations, which requires the determination of whether a project would have disproportionately high and adverse human health or environmental effects on low-income populations and minority populations. The EO, signed on February 11, 1994, requires all federal agencies to address the impact of their programs with respect to EJ. The EO requires that low-income and ethnic minority populations not receive disproportionately high adverse human health or environmental impacts and requires that representatives of any low-income or minority populations that could be affected by the project be involved in the community participation and public involvement process.

TABLE 3-4

POPULATION TRENDS AND PROJECTIONS

Place	Recorded Population			Population Projections				Growth Rate		
	1980[1]	1990[1]	2000[1]	2010[2]	2020[2]	2030[2]	2040[2]	1980–1990	1990–2000	2000–2040[2]
Hidalgo County	283,229	383,545	569,463	744,258	948,488	1,177,243	1,424,767	35.4%	48.5%	150.2%
City of Mission	22,551	28,653	45,408	61,154	79,551	100,157	122,454	27.1%	58.5%	169.7%
City of McAllen	66,281	84,021	106,414	127,458	152,045	179,586	209,386	26.8%	26.7%	96.8%
State of Texas	14,229,191	16,986,512	20,851,791	24,890,040	29,072,272	32,988,142	36,762,760	19.4%	22.8%	76.3%

[1] USBOC Data.

[2] TWDB Projections.

Source: USBOC, 1983, 2003; TWDB, 2003.

Methodology

A five-step methodology was patterned in part after the EJ Evaluation Approach published in the Transportation Research Board's "Environmental Analysis in Transportation" (Shalkowski, 2001). The steps are discussed below.

Step One: Step One is a test of disproportionate effects. A U.S. Census analysis is used to determine whether populations living within the study area exhibit a high proportion of either ethnic minorities or persons living under the line of poverty. An analysis of the relevant census tracts (Figure 3-4) was conducted to complete the disproportionate effects test.

The data used in this test to determine the potential for disproportionate impacts to low-income or ethnic minority populations within the study area are presented in Table 3-5. The information is based on the 2000 USBOC census tract, city, county, and state level data for ethnicity and income. The study area is encompassed within three USBOC-designated census tracts. An average of the three census tracts, the potential EJ Effects Area, is used throughout this discussion.

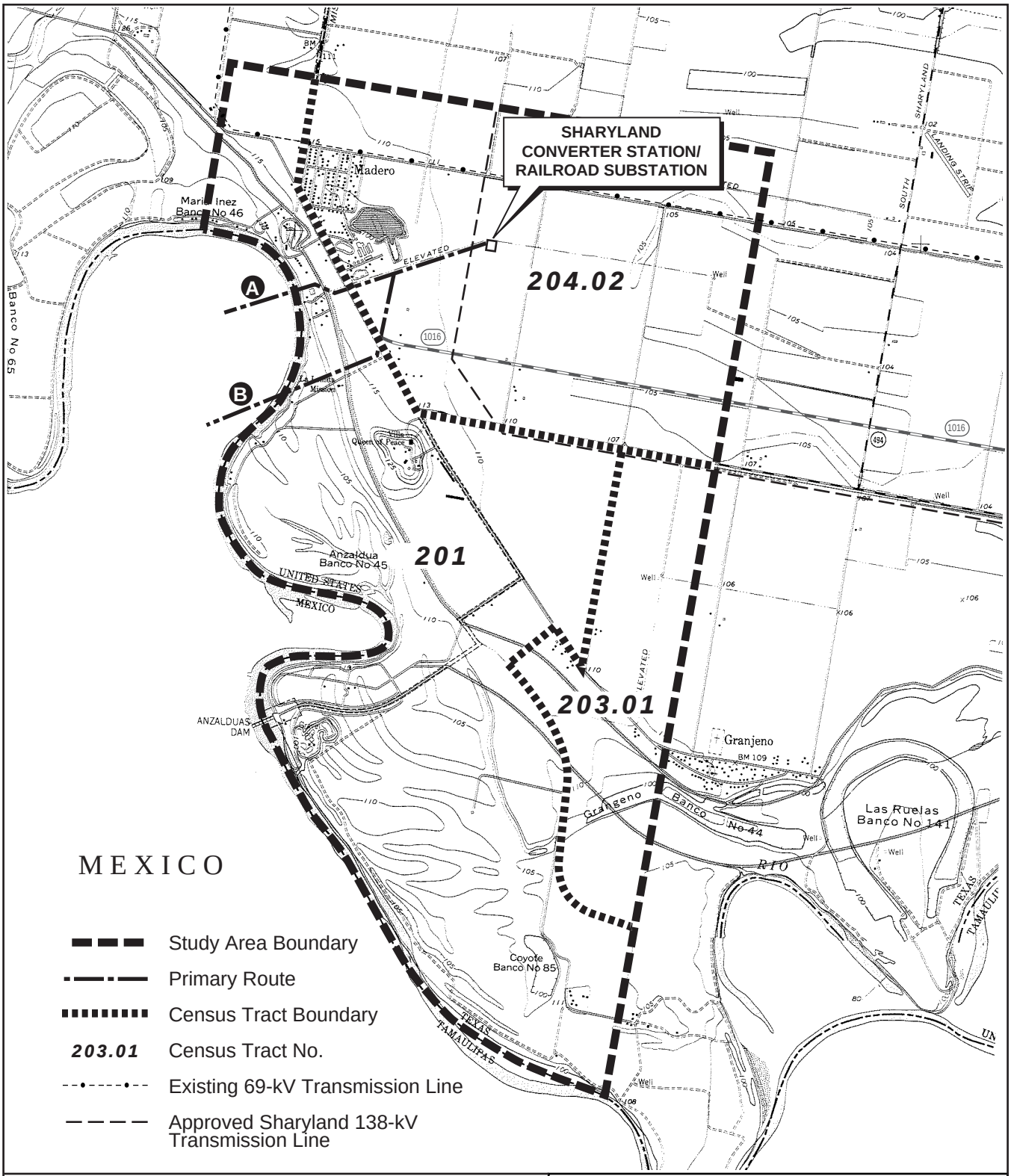
Also as shown in Table 3-5, in 1999 the EJ Effects Area had a higher percentage of persons living below the poverty line (38.4%) than either of the cities, the county, or the state. Therefore, there is a disproportionate number of low-income residents living within the study area.

Step Two: Step Two provides an evaluation of the findings of the disproportionate effects test. In this step, the findings of Step 1 are assessed and a determination is made to see if the EJ process has been completed or if further studies are necessary. If the potential for disproportionate effects to either ethnic minorities or persons of poverty status does not exist, then documentation of these findings completes the EJ process. However, if the potential for disproportionate effects to either of these demographic groups does exist, then steps 3, 4, and 5 would be necessary to complete the process.

Step Three: Step Three involves the development of a public involvement and outreach program. The goal of the program is to provide a reasonable opportunity for project stakeholders who represent minority and low-income groups that may be disproportionately affected to participate in, and provide input to, the project development process.

Step Four: Step Four involves the evaluation of impacts (positive and negative) on all affected communities and/or stakeholders. This step involves documentation of interests, issues, concerns, and observations that relate to ethnic minority and low-income groups that are expressed in the public involvement and outreach program and in public comments on the draft EA.

Step Five: Step Five is the final step of the EJ process. It involves the development of EJ mitigation measures. According to the EO, the EJ disproportionate effects determination should take into account committed mitigation and enhancement measures and potential offsetting benefits to the affected minority



north

0 2000 4000 feet

Base Map: USGS 7.5' Quadrangles; Hidalgo and Mission, Texas

PBS&J

• Engineering
• Environmental Consulting
• Surveying

Figure 3-4

CENSUS TRACTS
WITHIN THE STUDY AREA

SHARYLAND - DC MEXICO TIE PROJECT

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TABLE 3-5
ETHNIC MINORITY AND POVERTY DISTRIBUTIONS

Place	Total	Percent White	Percent Minority: Hispanic or Latino	Percent Minority: Black or African American	Percent Minority: American Indian or Alaska Native	Percent Minority: Asian	Percent Minority: Total Minority Population	Percent Below Poverty Level (1999)	Median Household Income (1999)
Census Tracts									
201	9,450	15.4%	84.1%	0.1%	0.0%	0.0%	84.2%	38.9%	$22,035
204.02	2,179	22.6%	75.8%	1.5%	0.0%	0.0%	77.3%	15.4%	$45,000
213.01	8,314	1.9%	97.9%	0.1%	0.0%	0.1%	98.1%	43.7%	$19,500
EJ Effects Area Total/Avg.	*19,943*	*10.6%*	*89.4%*	*0.2%*	*0.0%*	*0.0%*	*89.6%*	*38.4%*	*$28,845*
McAllen City	106,211	17.1%	80.1%	0.5%	0.2%	1.8%	82.6%	23.5%	$33,641
Mission City	45,920	17.5%	81.3%	0.4%	0.1%	0.3%	82.1%	26.8%	$30,647
Hidalgo County	569,463	10.4%	88.4%	0.4%	0.1%	0.5%	89.4%	35.4%	$24,863
Texas (in 1,000's)	20,851,820	52.4%	32.0%	11.3%	0.3%	2.6%	46.2%	15.0%	$39,927

Source: USBOC, 2000.

and low-income populations. The EJ mitigation measures should reduce or offset adverse community impacts accrued by the proposed action. Mitigation measures are developed through public involvement with affected minority and low-income community leaders and citizen groups. This process involves public participation and is used to minimize adverse community impacts.

The results and documentation of the five-step process is presented in Section 4.5.2 of this document.

3.7.1.3 Economic Trends

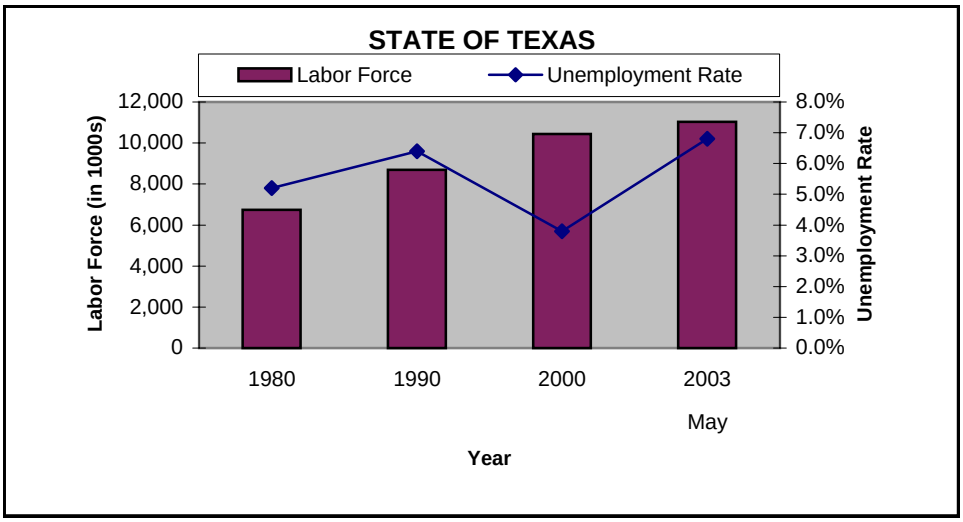
The economy within the study area exhibits many of the disparities that are characteristic to many border cities. Economic development within the region has been enhanced with the implementation of the North American Free Trade Agreement (NAFTA) in 1994. Much of this development is driven by the maquiladoras, which are U.S. or foreign-owned manufacturing facilities that process or assemble components in Mexico and ship them back to the country of origin, usually for more processing and distribution. Between 1988 and September 2001, 168 new companies had set up operations in McAllen, and another 210 had set up across the border in Reynosa. The McAllen-Edinburg-Mission MSA is now home to nearly 100 Fortune 500-company operations (McAllen Chamber of Commerce, 2003). Although the McAllen MSA is outpacing the rest of the nation in job growth, it also consistently ranks as the MSA with one of the highest unemployment rates, and the lowest per capita personal income level. In 2000, The McAllen-Edinburg-Mission MSA again recorded the lowest per capita income of all the MSAs in the nation at $13,344 (Bureau of Economic Analysis (BEA), 2002). The area's high population growth seems to be the source of the paradox between the booming job market and the continuing stagnant income levels. A recent comparison of the six border cities in Texas found that each city recorded strong employment growth by national and state standards, but that each city's population growth always exceeded the national and state levels. The conclusion reached was that legal and illegal immigration and a high birth rate make it difficult to raise incomes in these six cities, despite what looks like solid economic progress from a labor market perspective (Gilmer, et. al., 2001).

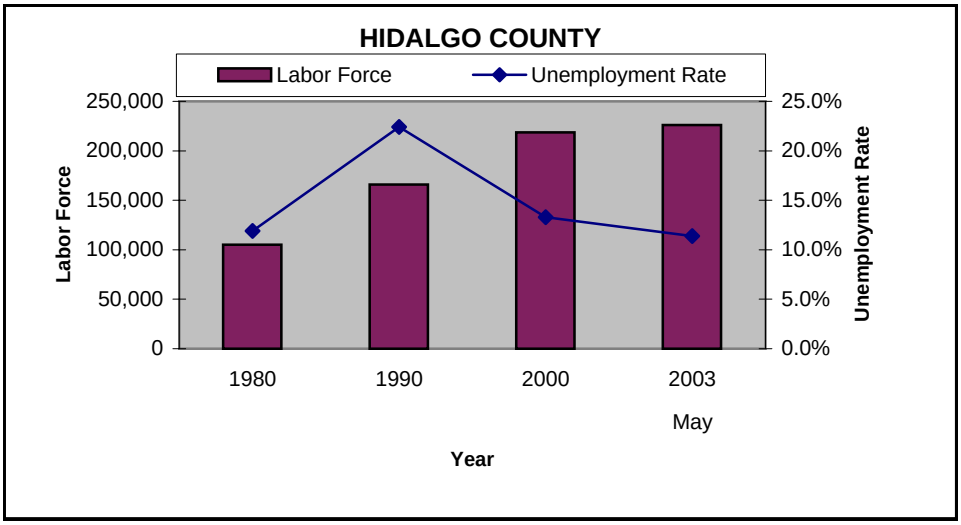
As shown in Figure 3-5, May 2003 TWC employment figures for Hidalgo County report a civilian labor force of approximately 226,080, an increase of 36% from 1990 (TWC, 2003a). A comparison of 1997 and 2002 fourth quarter employment in Hidalgo County shows that covered employment in 2002 had grown by approximately 33,681 jobs over 1997 levels. This represents an increase of 24% in the county, which is more than twice the state increase of 11.5% (TWC, 1997, 2003b). Despite the tremendous job growth, Hidalgo County continues to record one of the highest unemployment rates in the nation. As of May 2003, the county unemployment was recorded at 11.4%.

3.7.1.4 Leading Economic Sectors

As shown in Figure 3-6, the three leading employment sectors (government; trade, transportation and utilities; education and health services) account for 64% of the jobs in the county. In addition, agriculture remains an important industry within Hidalgo County. Easy access to Mexico and South Padre Island, as

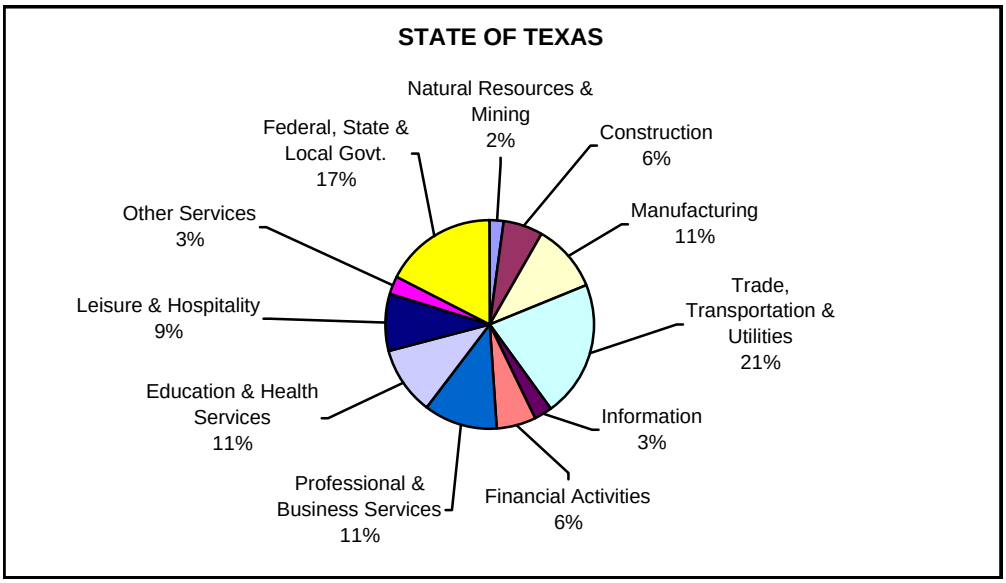
FIGURE 3-5
CIVILIAN LABOR FORCE AND UNEMPLOYMENT RATE

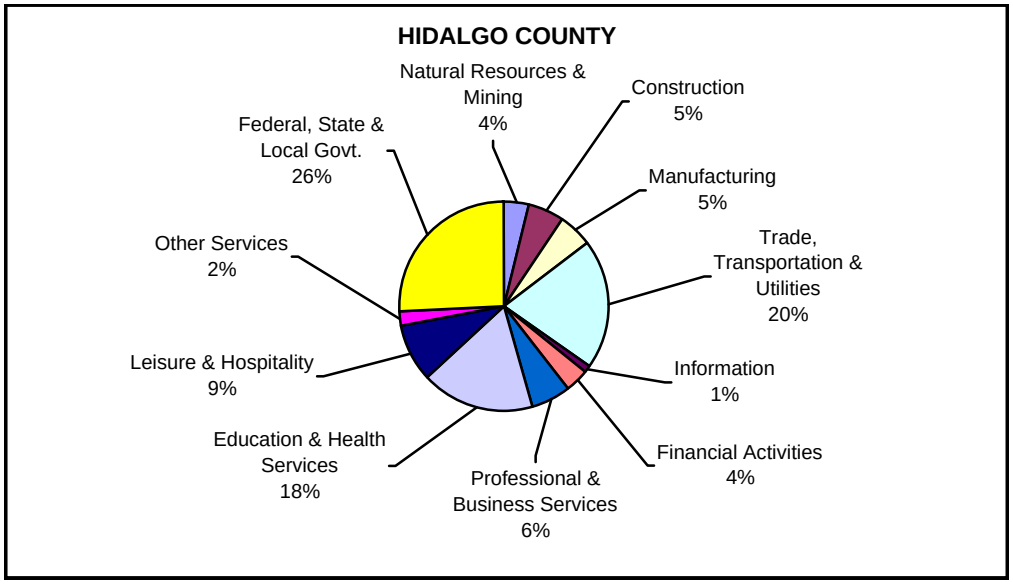




Source: TWC: 2003a.

FIGURE 3-6
COVERED EMPLOYMENT AND MAJOR EMPLOYMENT SECTORS
FOURTH QUARTER 2002





Source: TWC, 2003b.

well as an increase in world-class birding areas, has contributed to tourism being an important sector within the study area. Oil and gas activity also continues to be an important aspect of Hidalgo County's economy as well.

3.7.1.5 Agriculture

The market value of agricultural products sold in 1997 totaled $197,235,000, with crop sales accounting for 92% of the total market value. Crops harvested within the county include citrus, cotton, grain sorghum, sugar cane, vegetables, and melons (TASS, 1997).

3.8 LAND USE, AESTHETICS AND RECREATION

3.8.1 Land Use

The study area lies within southern Hidalgo County, and includes portions of the cities of Mission, McAllen, and Granjeno, and the community of Madero. Review of aerial photography (August 2000), USGS topographic maps, and land use data from the 1992 National Resource Inventory (NRI) (NRCS, 1992), confirms that cropland is the dominant land use in the study area. The NRI records show that in Hidalgo County, cropland (most of it irrigated) is the primary land use, accounting for 47% of the county, while rangeland is the second largest land use category, accounting for 28%. Cropland is distributed primarily in the southern two-thirds of the county (which includes the study area), and rangeland is mainly located in the drier, northern third.

Developed land uses account for about 12% of the total county area (NRCS, 1992). Due to dramatic population increases in the region, it is likely that developed land uses within the county have increased to an extent that is not reflected by the information on USGS topographic maps or in available NRCS data. Currently, urban land uses within the study area are limited primarily to the City of Granjeno and the community of Madero.

Land use within the study area is primarily agricultural, with a mix of other developed and undeveloped uses. An approximation of the type and percent cover of land use within the study area is shown below:

- Agricultural 50%
- Park, wildlife refuge 35%
- Undeveloped brushland 5%
- Residential 5%
- Commercial/ROW/other 5%

A large portion of the study area lies within the boundaries of Hunt Valley Development's Sharyland Plantation, a 2,428.1-ha (6,000-ac) master-planned development that is proposed to include residential, commercial, recreational, and industrial land uses. The design includes numerous neighborhoods, parks,

green spaces, six miles of jogging/biking paths, as well as retail, church, and medical buildings. Major elements of the development that are currently under construction or nearing completion include the Sharyland Business Park and Plantation Grove (including the Mission Sports Center). The business park is a 364.2-ha (900-ac), type A, master-planned facility with approximately 161.9 ha (400 ac) currently under development. Hawthorn Suites, LTD. has completed a facility that includes 101 fully equipped, one-bedroom suites (Hunt Valley Development, 2003).

Another large-scale project that will transform land use within the study area is the Anzalduas International Bridge Project. International border crossings between Texas and Mexico currently rank among the busiest in the nation. In 2001, the crossings in Hidalgo and Brownsville ranked third and fourth in the state, with 368,395 and 251,613 incoming trucks, respectively (Business and Industry Data Center, 2003). Construction of the $60 million project is expected to begin in 2003 and reach completion in 2005. The bridge will connect the 2,428.1-ha (6,000-ac) Sharyland Plantation with 6,475 ha (16,000 ac) being developed in Reynosa by Grupo Rio San Juan. The proposed design includes four vehicular lanes, a pedestrian walkway, and an 80-ac border port with an initial daily handling capacity of 900 cargo vehicles. The bridge will provide additional infrastructure for the area's expanding maquiladoras operations, and eventually tie into the proposed Interstate Highway 69 on the U.S. side of the border and Highway 40 in Mexico (Grupo Rio San Juan, 2002).

3.8.2 Aesthetics

Consideration of the visual environment includes a determination of aesthetic values (where the major potential effect of a project on the resource is considered visual) and recreational values (where the location of a transmission line could potentially affect the scenic enjoyment of the area). Aesthetic values considered in this study, which combine to give an area its aesthetic identity, include:

- topographical variation (hills, valleys, etc.)
- prominence of water in the landscape (rivers, lakes, etc.)
- vegetation variety (woodlands, meadows)
- diversity of scenic elements
- degree of human development or alteration
- overall uniqueness of the scenic environment compared to the larger region

Generally, the affected portion of the study area exhibits a low to moderate level of aesthetic quality, whether in the developed areas or the predominately agricultural lands. Landscapes with water as a major element, such as the Rio Grande, are often considered to present strong aesthetic values. However, due to the generally low relief of the study area, the lack of public access to the river and the degree to which the native, riparian vegetation has been altered or cleared along the banks, the Rio Grande is not considered as an area of high aesthetic value in this location. In the agricultural portions of the study area, brushy or

wooded areas, although scarce, provide variety and contrast in the visual environment, especially where adjacent to fields and pasture.

TxDOT has mapped 10 separate "Travel Trails" throughout Texas to provide travel routes through different areas of the state, highlighting natural, cultural and scenic attractions. These routes are described in pamphlets distributed by TxDOT offices and tourist information centers and marked by special signs along the designated highways. The "Tropical Trail," connecting Corpus Christi, Brownsville and Laredo, uses a portion FM 1016 and FM 494 within the study area as part of the overall route. Specific attractions noted within the study area include Anzalduas County Park, La Lomita Chapel, and La Lomita Museum and Farms (TxDOT, n.d.).

3.8.3 Recreation

Based on a review of aerial photography, USGS topographic maps, and TxDOT county highway maps, several parks/recreation areas were identified within the study area. Among these were the following:

Anzalduas County Park and Dam is an international diversion dam located on the Rio Grande in the southwestern portion of the study area. The park offers a boat ramp, picnic areas, and a large pavilion.

La Lomita Chapel, in the vicinity of Alternative B, is a historic site listed on the National Register of Historic Places (NRHP). The historic chapel is located in Capilla de la Lomita Historical Park, a Mission city park located south of Madero, just inside the IBWC levee.

The FWS has embarked on a high-priority program to acquire a wildlife corridor along the Rio Grande as part of the LRGV NWR. FWS is acquiring lands located generally between the IBWC levee and the Rio Grande, from Falcon Dam to the Gulf of Mexico, as well as other tracts that would either provide important habitat, or establish corridors between separate components of the NWR. FWS has already purchased over 36,421.8 ha (90,000 ac), comprised of numerous non-contiguous parcels and negotiations for other lands are ongoing throughout the region. Several tracts of this NWR are located in the southwestern portion of the study area and include the Tortuga Banco, Madero, Granjeno, Gabrielson, and Cottam tracts.

TPWD has also acquired numerous tracts across the Lower Rio Grande Valley that are operated as wildlife management areas (WMA). The Las Palomas WMA is comprised of 23 units (2,289 noncontiguous ha, or 5,656 ac) in Cameron, Hidalgo, and Presidio counties. Eleven of these tracts are in Hidalgo County, but none are located within the study area.

No national parks, national monuments, designated wilderness areas, or national grasslands/forests occur in Hidalgo County. The segment of the Rio Grande that forms the southern boundary of the county (and forms the United States border with Mexico) is not a part of the National Wild and Scenic Rivers System, nor has this stretch of the river been cited in the Nationwide Rivers Inventory (National Park Service

(NPS), 1982), or proposed for inclusion in a state Natural Rivers System. TPWD, however, lists the entire segment of the Rio Grande within the study area as permanently floatable for recreational purposes (TPWD, 1984). In 1998, President Clinton designated the Rio Grande as an "American Heritage River." This designation is part of a non-regulatory federal program to support local efforts to restore and protect the environmental, economic, cultural, and historic values of selected American rivers. The study area also lies within the Lower Rio Grande Heritage Corridor, a 322-km (200-mile) long corridor along both sides of the Rio Grande from Brownsville past Laredo. The purpose of the corridor is to stimulate and develop "cultural and heritage tourism" throughout the region (THC, 1991). No Indian reservations or other lands owned by Native American groups are located in Hidalgo County. One National Natural Landmark is located in the county: the Santa Ana NWR. This 809.4 ha (2,000-ac) unit of the National Wildlife Refuge System is located on the Rio Grande south of Alamo, outside the study area boundary.

3.8.4 Aviation/Transportation

A review of photography, USGS topographic maps, the Brownsville sectional aeronautical chart (Federal Aviation Administration (FAA), 2003a), the Texas Airport Directory (TxDOT, 2001), and the Airport/Facility Directory for the South Central U.S. (FAA, 2003b) found no public, private, or military airfields or heliports within the study area vicinity. The use of aircraft in support of farming activities is widespread throughout the Lower Rio Grande Valley, including portions of the study area. Airplanes are used for fertilizing and the application of pesticides and herbicides. The necessities of agricultural aviation generally require aircraft to operate at very low altitudes and thus, the location of transmission lines could potentially impact these operations.

Although portions of the study area are located within the city limits of both Mission and McAllen, most of the area is still rural and agricultural, with a network of county roads making up most of the local transportation network. FM 1016 is the major traffic artery within the study area, connecting US 83 in Mission to FM 336 in McAllen. FM 494 connects the community of Granjeno to the local roads and highways. Annual average daily traffic (ADT) numbers for FM 1016 within the study area range between 5,700 (north of Madero) and 8,400 (south of Madero). ADT for FM 494, north and west of Granjeno, is 700 (TxDOT, 2002).

The Rio Valley Switching Company operates approximately 49 miles of rail track in the Lower Rio Grande Valley, including a branch line that runs parallel to portions of FM 1016, FM 494, and Acapulco Avenue, and ends in the McAllen Free Trade Zone, east of the study area.

Although the Rio Grande is listed as a navigable waterway by the USACE, there is no commercial shipping on the river. Boat traffic is limited to individual recreational use and guided tours.

3.9 CULTURAL RESOURCES

3.9.1 Cultural Setting

The study area is confined to a small portion of Hidalgo County, which lies within the Lower Rio Grande Heritage Corridor (Sanchez, 1991), and within the Rio Grande Plains Archeological Region of the Central and Southern Planning Region as delineated by the THC (Mercado-Allinger et al., 1996) and shown on Figure 3-7. The following discussion briefly summarizes each of the major archaeological and historical developmental stages relevant to the study area. Archaeological developments in this part of Texas are usually classified according to four primary chronological and developmental periods: Paleoindian, Archaic, Late Prehistoric, and Historic (includes Historic Indian). These classifications have been defined primarily by changes in material culture over time, as evidenced by the material remains, settlement patterns, and artifacts recovered from archaeological sites. A general theoretical tenet that underlies this classification scheme is that change in material culture reflects behavioral and cultural adaptation to changes in the natural and manmade environment. Historic developmental periods are generally divided according to major shifts in geopolitical control of the area other major economic developments that widely influence land use and occupation patterns.

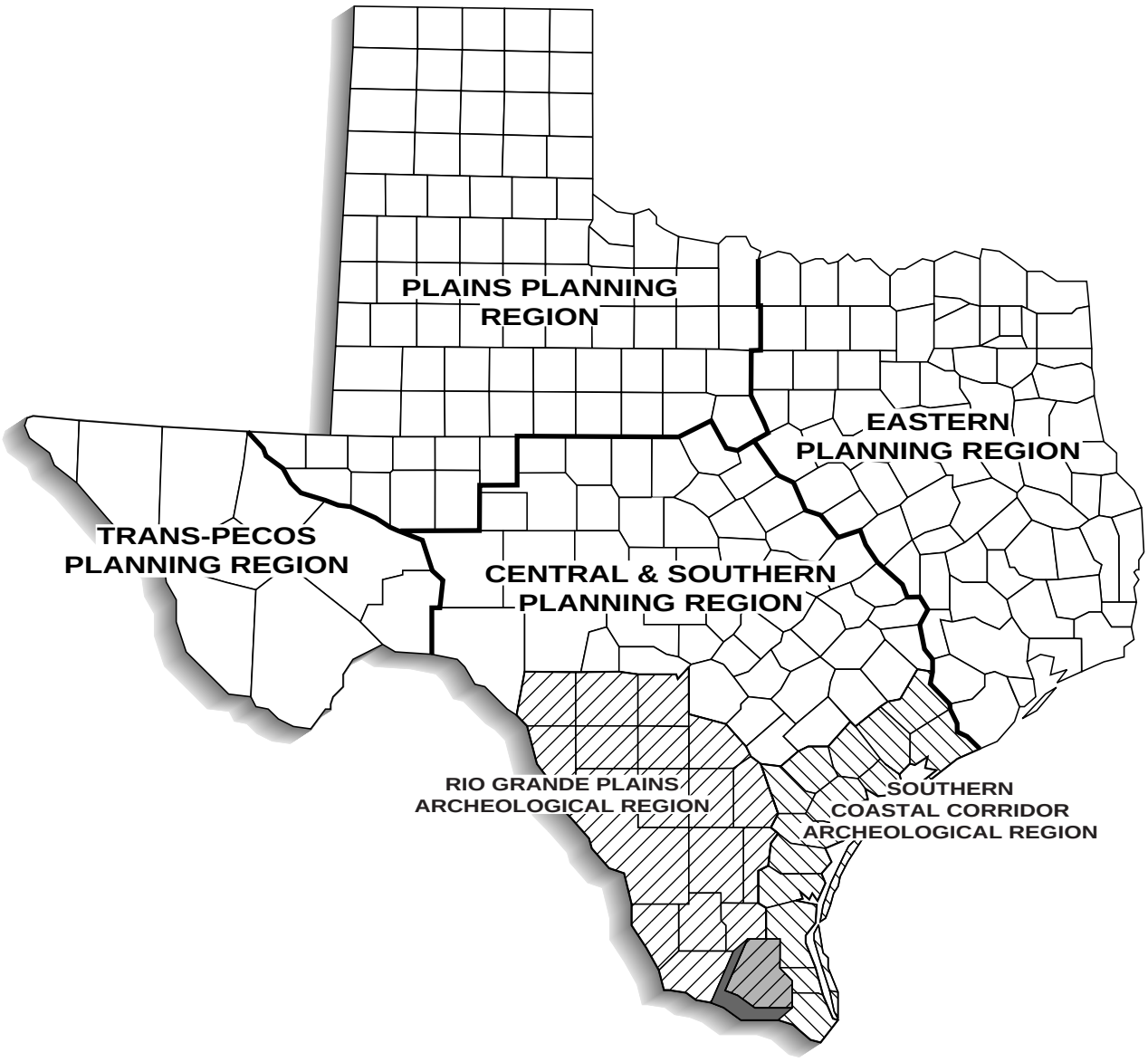
3.9.1.1 Archaeological Developments

The prehistory of the Rio Grande Plains of Texas is poorly understood, in part because archaeological investigations have primarily been limited to surface collections by professional and amateur archaeologists. To date, no extensive controlled excavations have been undertaken in the area and, except for burials occasionally found in the region, definable subsurface components and/or stratigraphy are only rarely found south from Baffin Bay to the Rio Grande. It is possible that resources from any of these periods could occur within the study area, although the likelihood that they may be impacted by the project is impossible to accurately predict.

Paleo-Indian

The earliest evidence of man in the Rio Grande Plains Archeological Region is recognized as the Paleoindian period. This period dates from about 10,000 B.C. to 6,000 B.C. Sites from this period are recognized based on diagnostic dart point types such as *Clovis*, *Plainview*, and *Angostura*. During the Paleoindian period, great expanses of land were inundated by the rising sea levels. The sea levels rose due to the melting of glacial masses at the end of the Pleistocene. The final rise in sea level began about 18,000 years ago, with the present coastline being achieved about 3,000 years ago (Brown et al., 1976).

In the greater south Texas and northeast Mexico area, several Paleoindian sites have been reported, and in a few cases excavated. At Falcon Reservoir, in Starr County, the Evans site on the U.S. side of the Rio Grande yielded an artifact possibly associated with extinct megafauna (Cason, 1952). On the Mexican side of the Rio Grande, archaeologists have found flint debitage and an artifact eroding out of a mammoth



north

100 0 100 200

scale in miles

Source: Mercado Allinger, et al., 1996

PBS&J

• Engineering
• Environmental Consulting
• Surveying

Figure 3-7

LOCATION OF HIDALGO COUNTY IN RELATION TO THE CULTURAL RESOURCES PLANNING REGIONS OF TEXAS

SHARYLAND - DC MEXICO TIE PROJECT

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locality (Krieger, n.d.). A *Plainview* point was found at another Falcon Reservoir site (de la Borbolla and Arroyo de Anda, 1953) and excavations by Weir (1956) and Newton (1968) isolated a Paleoindian component at the La Perdida Site, also in Starr County, as identified by *Plainview*, *Meserve*, *Angostura*, *Scottsbluff*, and *Clovis* projectile points. The general location of these discoveries within environmentally and geographically similar portions of northern Mexico and southern Texas suggests that similar Paleo-Indian sites may occur in or near the study area.

Archaic

As the climate changed and the big game animals died out, there was a transition into the Archaic period. Recognized Archaic dart points in the Anderson collection collections made in south Texas by A.E. Anderson between 1908 and 1940 suggested the presence of Archaic peoples in the area; however, no Archaic sites on the lower Texas coast have ever been excavated.

South of the study area, MacNeish (1958) published pertinent information, including a chronology for the Archaic in Tamaulipas, after three seasons of survey and excavation. He considered diagnostic artifacts and geographic distributions in defining three Archaic complexes and phases for northern Tamaulipas. They are, from earliest too latest, the Nogales, Repelo, and Abasolo complexes, and span the period from 5,000 B.C. to A.D. 100. He made comparisons to Archaic materials from Falcon Reservoir, where the Archaic Falcon focus was defined with an estimated temporal span of approximately 5,000 B.C. to A.D. 500 or 1,000 (Suhm et al., 1954). The general location of these discoveries within environmentally and geographically similar portions of northern Mexico and southern Texas suggests that similar Archaic sites may occur in or near the study area.

Late Prehistoric

Following the Archaic, the Late Prehistoric period, termed Neo-American by Suhm et al. (1954), is the last prehistoric period in the Rio Grande Archeological Region. This period is marked by the presence of arrow points in the artifact inventory. Although in many areas of Texas ceramics appear on archaeological sites during this stage, ceramics are relatively scarce in the Lower Rio Grande Valley.

The bulk of our knowledge of the archaeology of south Texas is from the Late Prehistoric this period. MacNeish (1958) has defined two closely related complexes, the Brownsville and Barril, for the Lower Rio Grande delta. Common to both complexes are shell disks, pierced shell disk beads, plugs made from a columella that are round in cross section, rectangular conch shell pendants, mollusk shell scrapers, and *Starr*, *Fresno*, and *Matamoros* projectile points. Intrusive pottery of Huastec origin from southern Tamaulipas appears in occupation sites and in burials (Anderson, 1932; Mason, 1935; MacNeish, 1947). The general location of these discoveries within environmentally and geographically similar portions of northern Mexico and southern Texas suggests that similar Late Prehistoric sites may occur in or near the study area.

Historic Indian (16th century to Ca. 1870)

The term Historic Indian refers to the indigenous people described by the Spanish, who were the first Europeans to explore the coastal region of Texas. The Spanish encountered people speaking the Coahuiltecan language in southern Texas and northeastern Mexico (Salinas, 1990). Research has indicated that the Coahuiltecans probably never existed as a single tribe (Hester, 1999; Gardner, 2001). Rather, groups with similar language were identified by the Spanish as Coahuilteco presumably because the native homeland of many groups was Coahuila, Mexico. Although there is a group based in the San Antonio area that calls itself the Tap Pilam-the Coahuiltecan Nation (Gardner, 2001), there is no federally recognized Coahuiltecan tribe today. This group has filed a petition for recognition by the Secretary of the Interior that the group exists as an Indian tribe (*Federal Register*, 1998).

Historic Indian tribes that have in the past inhabited this part of Texas include the Comanche, Kiowa, and Lipan Apache. The traditional homeland of the Lipan Apache included the area between the Texas Panhandle and the Hill Country of central Texas (Gardner, 2001), but by 1775 they had gained control of south Texas as well (Tyler, 1996). The Comanche came into south Texas in the early nineteenth century following herds of wild mustangs and bison. The general presence of these tribes within south Texas suggests that related sites may occur in or near the study area.

3.9.1.2 Historical Developments

Spanish Exploration and Settlement

The Spanish are recognized as the first European nation to claim territory that encompasses the Lower Rio Grande Valley Beginning with exploratory expeditions in the early part of the 16th century, their presence in the area for the next 300 years was for the most part limited to brief military expeditions. Though rarely found, archaeological sites dating from this period could occur in or near the study area and would be considered important for their historical and archaeological research value.

No serious attempts were made to colonize the Lower Rio Grande Valley until the mid-eighteenth century when Spanish authorities demonstrated renewed interest in settling land that included the Lower Rio Grande valley, present day Hidalgo County, and northern Mexico. Although originally deemed uninhabitable by the Spanish, between 1749 and 1752 four settlements (Reynosa, Camargo, Mier and Revilla (present day Guerrero)) were founded and large land grants, called *porciones*, were issued along the Rio Grande to prominent Spanish families. One of these original Spanish land grants, called *Rancho La Lomita*, was issued to Joseph Antonio Cantu in 1767. Ranching became the dominant use of the land and small rancheria settlements became scattered across the landscape. Very few surviving ranching operations in the area can be traced continuously back to this period, although abandoned sites from this period could be present and would be considered important for historical and archaeological research.

Mexican Statehood to Independent Republic of Texas

As Spain's claim to the area yielded to Mexico following the Mexican Revolution in 1821, settlement was still sparse except where it became focused around a few key port towns along the Rio Grande. Mexico, like Spain, continued to encourage immigration and settlement in the lower Rio Grande, especially along the navigable stretch of the river as far north as Roma in Starr County. Prior to this, Vera Cruz had served as Spain's sole open port in Mexico, which made the transporting of goods to more remote areas in the colony difficult, expensive, and time consuming. With the opening of a port at Matamoros in 1823, however, trade with the rich hinterlands of northern Mexico was more accessible. The port at Matamoros provided an important means to transport cattle from ranches in the area. As trade increased and Matamoros grew, Americans and Europeans came seeking economic opportunities as merchants (Graf, 1942). Eventually, immigrant Anglos such as the McAllens, and the Kings would adopt many of the traditional Spanish and Mexican ranching practices in developing their own ranches in valley and South Texas.

With the establishment of the port at Matamoros, steamboat service to the area was initiated. However, the difficulty of navigation on the river and the lack of cooperation among merchants in the area stalled early efforts to develop maritime commerce. In the mid to late nineteenth century period, steamboat travel and shipping gained considerable significance. As an indirect consequence, the Rio Grande is known to contain numerous shipwrecks, some of which may occur in the study area.

Mexico did not completely abandon its claim to the Lower Rio Grande Valley as a consequence of the Texas Revolution (1835-1836). Even after Texas was admitted to the United States in 1845, the Rio Grande River was still the subject of an international territorial dispute between Mexico and the United States. Military events associated the Texas Revolution and the American-Mexican War (1846–1848) occurred in the region but outside of the current study area. However, the Old Military Highway generally follows the river, and passes near the study area. Consequently, military sites from the nineteenth century could occur in or near the study area.

After the Treaty of Guadalupe Hidalgo in 1848 defined the Rio Grande as the United States-Mexico boundary, the study area became part of San Patricio County, then later the same year it became part of Cameron County. The formation of Hidalgo County occurred in 1852 (Tyler, 1996). Stock raising continued to provide the primary economic base for the region. However, with the parceling of the original land grants, areas near the Rio Grande grew into villages and the river communities became more involved in transportation, agriculture, and trade with Mexico (Thompson, 1965). In 1852 a village name La Habitacion was renamed Edinburgh and made the county seat of Hidalgo County. The first court that convened in Edinburgh granted licenses for ferries to travel across the Rio Grande from the United States to Mexico. The ferries were located at Hidalgo, San Luis, Penitas, and Las Cuevas.

The Rise of the Irrigation Agriculture, Industry and Tourism

Throughout the latter nineteenth century rangeland was vast but crop production was limited to a subsistence level for most of the Rio Grande Valley. However, with the arrival of rail transportation in the early years of the twentieth century the economy and traditional patterns of land use in the valley were dramatically transformed. It suddenly became possible to bring in large-scale pumping equipment needed to irrigate large tracts of fertile land adjacent to the river. Through the efforts of enterprising businessmen and civic leaders, such as John H. Shary, dozens of pumping plants and hundreds of miles of public and private irrigation canals were constructed across the valley. Within the study area is an abandoned segment of the Old Edinburg Canal, part of a canal system operated by Hidalgo County Water Control and Improvement District No. 4. Proximity suggests that this canal provided water for the former Valley Brick and Tile Company and the nearby Madero community. More importantly, the Louisiana-Rio Grande Canal Company Irrigation System, located nearby but outside of the study area, is a National Register-listed landmark that exemplifies the relationship between these industrial operations and non-traditional settlement and employment patterns that developed in the valley during the early twentieth century.

Concurrent with the rise of irrigation agriculture and industry was the development of automotive technology, which, in turn, supported the development of tourism as an alternative industry. Since its early development in the 1920s, tourism has become a significant force in the local economy focusing on the natural and historical resources within the area. Historical places like La Lomita Chapel and Chimney Park (within the study area) have been redeveloped to accommodate the seasonal influx of winter tourists from northern states. Similarly, the establishments of natural parks, like Bentsen-Rio Grande Valley State Park, have served to expand the eco-tourism aspect of the area's economy. This trend toward natural and heritage tourism is being encouraged through studies sponsored by local environmental consortiums (Consortium of the Rio Grande, 1997) and the THC (1991), both of which have surveyed the Lower Rio Grande Valley and made recommendations regarding resources that are naturally and culturally important. For example, the THC's heritage tourism assessment of the lower Rio Grande Valley (Sanchez, 1991) identifies the Hidalgo Irrigation Pump Plant and El Granjeno Cemetery as important visible remnants of the early twentieth century rise of industry and irrigation agriculture and the influence those developments had on the many small river communities. Notably, the lower Rio Grande itself has been nominated as an American Heritage River for its combination of natural and cultural resources that represent the long history of the area.

3.9.2 Results of the Literature/Records Review

The records review and literature search for the Sharyland-Mexico Tie Project in Hidalgo County were conducted at the Texas Archeological Research Laboratory (TARL) at the University of Texas at Austin, and at the THC. The files at TARL were used to identify previously recorded archaeological sites within or near the study area. The files at the THC were used to learn if any sites listed on or determined eligible

for listing on the NRHP are within the study area boundaries. The THC files were also used to identify State Archeological Landmarks (SAL) and State Historical Markers in the vicinity of the study area.

The records at TARL identified 176 recorded archaeological sites in Hidalgo County, none of which are located in the study area. The THC files identified 15 NRHP-listed properties, three of which are historic districts. Based on this information, one of the NRHP-listed historic districts, the La Lomita Historic District, is in the study area. The THC's Texas Historic Sites Atlas website also identifies official state historical markers for the "Spiderweb Railroad" and Juan Davis Bradburn. One branch of the original early twentieth century "Spiderweb Railroad" still runs through the study area although it is now owned and operated by the Southern Pacific railway system. Juan Davis Bradburn was an Anglo military officer who was a leader of Mexican troops in Mexico's early nineteenth century revolution against Spain. His marker reports that his burial location is unknown but may be on the nearby hill called La Lomita.

The registered boundary of the La Lomita Historic District encompassed 49.4 ha of a much larger ranch given to the missionary Oblate Fathers by Rene Guyard, a native of France who acquired the "La Lomita" porcione in 1851 (THC, 1975). The Oblate Fathers constructed a simple chapel in 1865 that was destroyed by flooding and replaced by a second small chapel constructed in 1899 and restored in 1949. Two other significant historic structures on the property include a 2-story frame convent and St. Peter's Novitiate, a grand Mission style structure surmounting the landmark hill for which the original La Lomita ranch was named. Both of these were constructed in 1912, and have since been integrated into a redeveloped teaching complex with multiple bunkhouses, classrooms, and offices. Plans to build greenhouses and cultivate land for row crops were not completed and the hilltop today is densely covered with trees and dense vegetation. Since 1975, when the district was nominated for National Register listing, portions of the 49.4-ha registered site boundary have been subdivided, consequently disconnecting the old La Lomita Chapel, now operated as a city park, from St. Peters Novitiate and the hilltop for which it is named. The La Lomita Chapel and St. Peter's Novitiate are both marked with official state historical markers.

Since the La Lomita Historic District was established, the study area, like much of the Lower Rio Grande Valley, has undergone and continues to undergo dramatic urban and suburban expansion. Only in rare instances do sites like Rancho Toluca near Progreso survive sufficiently intact to represent the valley's Spanish ranching heritage. Similarly, sites representing the missionary heritage are exceedingly rare in the rapidly modernizing environment of the Lower Rio Grande Valley. Among the few surviving mission sites are La Lomita Chapel (1899/1949) and St Peter's Novitiate (1912), both of which have undergone dramatic setting changes and are now cut-off from each other by modern road and levee systems. These sites are increasingly surrounded by residential and commercial development that occupy the mission's former expanse of ranch land.

3.9.3 Archaeological Investigations

In addition to the records review, a review was conducted of previous archaeological survey reports and related literature regarding archaeological investigations in and around the study area. Because very few archaeological investigations have been conducted in the study area, the archaeological literature review examined investigations from across a much wider portion of South Texas and northern Mexico. A full summary of the literature review is provided in Appendix B of this document. For the immediate study area, the most relevant investigations have been those done for local area water control and drainage improvement projects (Prewitt, 1974; Mallouf, et al., 1977; Prewitt and Day, 1981; Etchieson and Boyd, 1982; Mercado-Allinger, 1983; Prewitt and Mercado-Allinger, 1983; Prewitt, 1986; Hall et al., 1987; Quigg et al., 1989; and Bouseman et al., 1990), which recorded hundreds of sites, all outside of the current study area. Within the current study area, EH&A conducted a cultural resources survey of a transmission substation for Central Power and Light Company's proposed 138-kV Sharyland Transmission Line Project (Schmidt, 1998), but no sites were identified.

Because complete archaeological survey information for the present study area is lacking, the area's potential for archaeological resource impacts was assessed through the identification of archaeological high probability areas (HPA). The HPA identification took into account topographic setting, environment, the availability of raw material, water, and subsistence resources, as well as historical maps. Most of the present study area occurs within an expansive alluvial floodplain, the type of setting that favors deposition and burial of intact sites, and thus qualifies as an HPA. Similarly, the area beyond the floodplain has a high probability for containing surficial or shallowly buried archaeological sites and, thus, was also considered to qualify as HPA.

After the preferred alternative (Alternative A) was selected, a pedestrian archaeological survey of the ROW was conducted, as required by the SHPO. The results of the required cultural resource survey are documented in detail in Appendix B of this document. Briefly summarized, no cultural resource sites were encountered in the survey and shovel testing proved negative, suggesting that shallow prehistoric deposits are unlikely to remain intact within the area of potential effect. However, the depth of soils within the HPA nearest the river were sufficient to recommend archaeological monitoring during excavation of transmission pole locations 1, 2, and 3 in order to document any cultural materials that may be displaced from deeply buried contexts. Completed and reported in November 2003, the survey results and recommendations were coordinated with and approved by SHPO (Martin 2004), clearing the project for federal permitting.